Gurudakshina: Facets of Indian Archaeology

Essays presented to Prof. V.N. Misra

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Edited by

Alok Kumar Kanungo



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Editorial

Today Prof. V.N. Misra (Misraji) completes 70 years of his life. He is one of the most respected archaeologists of India, having a profound knowledge of archaeology, anthropology and ancient literature. In his career of nearly half a century in archaeology, he has supervised research of 25 Ph.D. students, and dissertations of a number of M.A. and M. Phil. students on diverse topics in fields like Palaeolithic, Mesolithic, Neolithic, Chalcolithic, Rock Art, Harappan Civilization, Historical archaeology, bronzes, ceramics, and ethnoarchaeology. In these days of growing narrow specialization Misraji is one of the small number of archaeologists in the country to have supervised research in such a diverse range of subjects. That prompted me to edit a volume out of Ph. D. dissertations completed under his guidance. Unfortunately, one of Misraji's students, S.C. Nanda is no more. Almost all his students are employed in different academic positions in India, Bangladesh and Nepal. This has its plus as well as minus points; the plus being that all are academically oriented and many of them are active in research; the minus points are that some have diverted themselves to research areas quite different from their Ph.D. topic, and some are fully occupied with the administration of their institutions. But then who would not like to refresh his/her memory of doctoral research? And those memories led to this volume.

The volume is purposely designed in such a way that all the papers are based on the Ph.D. dissertations of the contributors, and divided into two parts; Part I covers the gist of the thesis, and Part II covers the changes and improvements which the author would have made if he/she were to do the same research today. This part was not mandatory for scholars who got their degree in last five years[1]. I felt that a volume of this kind will probably be useful to all students of archaeology and can be widely distributed. This will also make available to scholars all the research done under Misraji in one place, and also give some idea of the kind of research that has been carried out at the Deccan College.

As regards Misraji's own publications, keeping in view their number and diversity of themes, I decided to invite two specially written papers: one an annotated bibliography of all his writings by Dr. P.P. Joglekar, and the other an evaluation of his position in the Indian archaeological context by Prof. K.K. Basa. I myself have written a piece on Misraji as an archaeologist and human being. Some overlap among these three papers is unavoidable. However, there are significant differences in our approaches. My paper basically gives a chronological account of Misraji's research career while Joglekar highlights the main points of each of his major publications. And Basa attempts an evaluation of the various aspects of Misraj's work. In all these three papers, Misraji being the core subject, justice could only be done by scholars who have not been his students but know him and his work well.

I had thought of this volume when Misraji attained the age of 65 years and I was just starting my Ph.D. but I did not dare to ask for papers from such senior people and thought I should wait until I am better equipped to edit such a volume. I started inviting the papers on *Diwali* day in November 2004. No sooner had I sent out the invitations to the potential authors, I started getting overwhelming response. This naturally reflects the regard which Misraji's students have for him. Not many people may be knowing that two of the contributors, Katy Dalal and Kurush Dalal, are mother and son. This may well be the only example anywhere that parent and child have done Ph.D. under the same teacher. Although I shared the idea of this volume only with the contributors, the word slowly got out and many of Misraji's admirers wanted to contribute to the volume. However, I explained to them that I wanted the volume to be restricted only to the contributions of Misraji's students, the exceptions being the two invited contributions and one of my own[2].

The 17 papers by Misraji's Ph.D. students cover the period from the Palaeolithic to the early historic time in India, and one paper on the early historic period of Bangladesh (Rahman). Region-wise in India, three papers are related to south (Jayaraj,

[1] Though some authors have finished their Ph.D. earlier than 5 years but have not written the IInd part due to various unavoidable reasons.

[2] Shaik Abdul Munaf, co-author with Jacob S. Jaya Raj is not a student of Misraji but of Jacob who did the library work for the paper.

Raju and Reddy); three to north (Ansari, Hoque and Kharakwal); one to centre (Alam); four to west (Dandekar, Kurush Dalal, Mishra and Thomas); one to northwest (Katy Dalal); and three to east (Akhilesh, Basak and Panda-Roy). Sunil Gupta's paper is not limited to a particular region. In terms of cultural periods, five papers are related to prehistory i.e. Paleolithic and Mesolithic (Akhilesh, Alam, Basak, Jayaraj, and Raju); three to Protohistory (Katy Dalal, Kharakwal and Mishra); two to Prehistory and Protohistory together (Hoque and Reddy); four to Early Historic (Kurush Dalal, Dandekar, Gupta and Rahman); one to Archaeozoology (Thomas); and one to Ethnoarchaeology (Ansari). Panda-Roy's paper covers the period from the prehistoric to the early historic.

Shafiqul Alam reports the typological, technological, functional and stylistic variability among the Palaeolithic stone tool industries of Bhimbetka in central India on the basis of a detailed metrical analysis. He also attempts to explain the formation of archaeological record at the site.

Jacob Jayaraj and Abdul Munaf discuss the cultural evolution during the Palaeolithic and Mesolithic periods in the Tirupati valley, Andhra Pradesh in the context of topographical setting, drainage pattern, raw material and other resources, and use analogies of the subsistence strategies of the Yanadi hunter-gatherers and fishermen living in the same region.

D.R. Raju's paper summarises his investigations of the rich Upper Palaeolithic sites located along permanent water pools in the Gunjana valley in Andhra Pradesh, and explains their location with the help of the use of the same water resources by the Yanadi hunter-gatherers and fishermen.

Bishnupriya Basak examines the microlithic sites in the Tarafeni valley in north-west Midnapur in West Bengal and tells us about her ongoing work in the area which focuses on prehistoric land use patterns.

Kumar Akhilesh reviews the present status of the Upper Palaeolithic 'Damin' industries of the Bansloi river basin, Jharkhand on the basis of finds from his field work. The study examines the stratigraphic context of the sites and artefacts, nature of artefact assemblages, inter-site variability of lithic technology, and prehistoric landuse patterns.

Katy Dalal's paper discusses the Early and Mature Harappan ceramics of the Ghaggar (Sarasvati) valley with special reference to the site of Binjor. She was the first person to discover Hakra Ware sherds in the Ghaggar valley.

J.S. Kharakwal summarizes the results of his discoveries of rock art, cist burials and archaeometallurgical sites in the Kumaun region of the Himalayas. He suggests that Khasas were the probable authors of these burials, and Kumaon played an important role in the diffusion of metal technology and urbanization process in the Ganga Valley.

Anup Mishra gives an account of the varied ceramics found in the Chalcolithic levels at Balathal, and discusses the changes through time.

V.R. Reddy reports his discoveries of a large number of Mesolithic, Neolithic, ashmound, and megalithic sites, and excavation of the ashmound at Palavoy in the semi-arid region of Andhra Pradesh. Palavoy has yielded a very interesting bone tool industry.

M.M. Hoque's paper gives an account of the settlement patterns during the prehistoric and protohistoric periods in the Middle and Lower Ganga Valley in the context of landscape, soils, climate, water sources, flora and fauna.

Sunil Gupta writes on the historiographical framework of the early maritime trade in the Indian Ocean. He attempts to reconstruct, primarily from archaeological evidence, aspects of sea borne commerce between India and the Roman Empire.

S.S.M. Rahman attempts a reconstruction of the cultural history and settlement patterns in the Bogra district, Bangladesh during the Early Historic and Early Medieval periods mainly on the basis of his own field work.

Kurush Dalal reports his study of the non-ceramic material remains, including two interesting terracotta sealings, from Early Historic Balathal. According to him Balathal, located on a north-south trade route, was a major centre of the production of iron objects and their trade.

Abhijit Dandekar's paper attempts to understand the local traditions of pottery shapes and technology in the Early Historic period at Balathal in Rajasthan in relation to surrounding regions.

P.K. Thomas writes on the role of faunal remains in the reconstruction of the subsistence patterns of the Mesolithic and Chalcolithic communities of western India. His study was the first in India of the total faunal remains from an archaeological site (Bagor). He also discusses the methodological advances in archaeozoological research, with special reference to work at the Deccan College.

Shahida Ansari has attempted a reconstruction of the settlement and subsistence patterns during the Mesolithic-Chalcolithic periods in the South-Central Ganga Valley on the basis of archaeological data collected by archaeologists of the Allahabad University and her own extensive field work among the primitive communities of Kols, Musahars and Mallahs of the region.

Tama Panda-Roy has attempted to trace the socio-cultural evolution in the area covered by the undivided coastal districts of Puri and Ganjam, and inland district of Sambalpur in Orissa on the basis of geographical, archaeological, historical, ethnographic, and linguistic data.

All the papers in the volume were sent to different referees and all of whom have been most cooperative. I thank Drs. Kishore K. Basa, Kuldeep K. Bhan, Ravi Korisettar, M.L.K. Murty, S.B. Ota, Vinod Nautiyal, Gautam Sengupta, V.H. Sonawane, and Rakesh Tewari for sparing their time to read the papers and give their comments. I am grateful to Ravi Misra for proof reading; Shriikant Pradhaan for making the sketches of professors K.N. Sharma, D.N. Majumdar, H.D. Sankalia and V.N. Misra; Trupti More for archival help; and Shahida Ansari for listening and discussing everyday on this volume through out the year.

I am grateful to John and Erica Hedges for agreeing to publish this volume in the BAR series and bringing it out in a short time.



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17th August 2005

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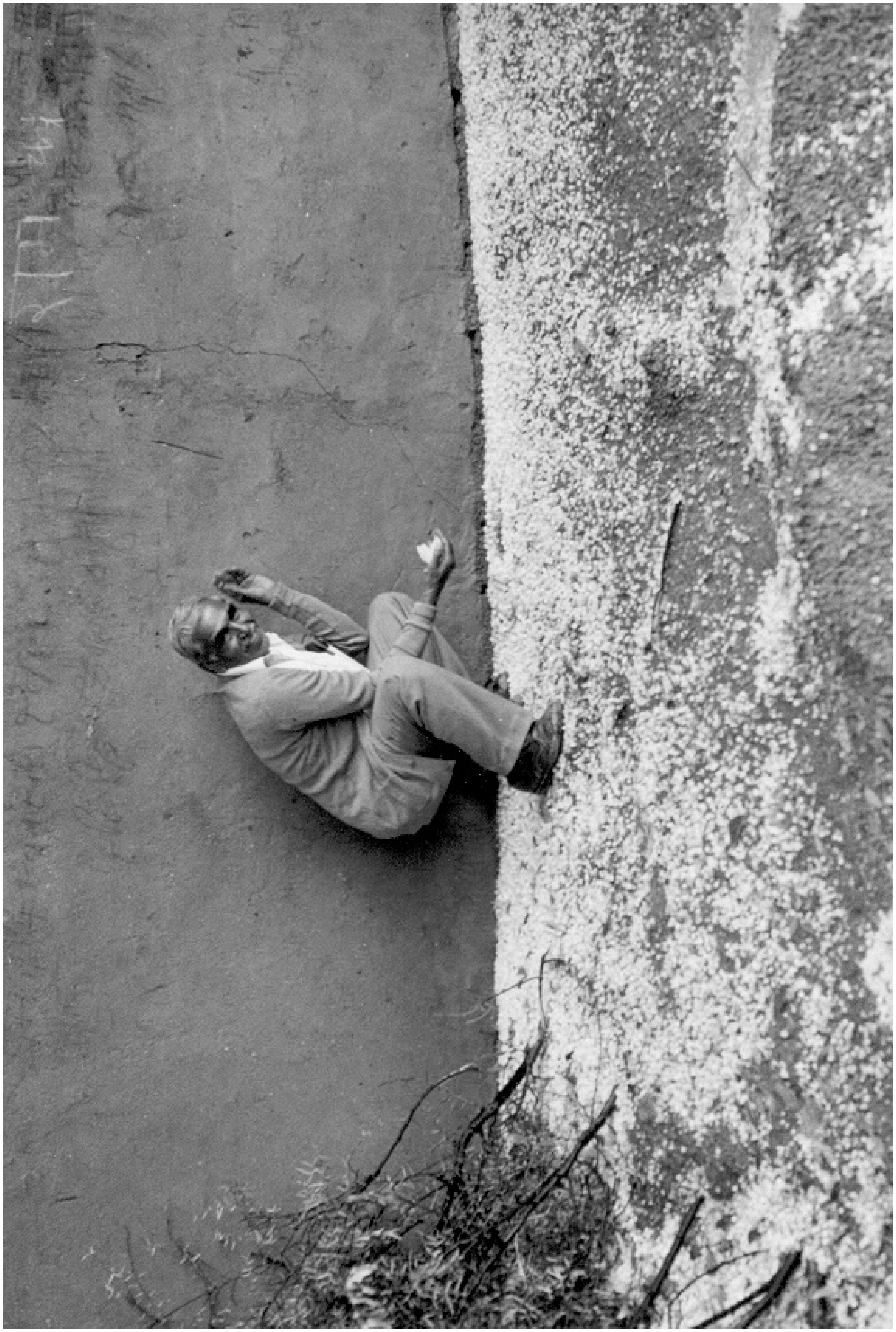
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Contents

Virendra Nath Misra: Archaeologist and Human Being

Alok Kumar Kanungo

I. Background (Education)

Virendra Nath Misra (VNM) was born on 17th August 1935 in a farming family in Khandauli village in Farrukhabad district of Uttar Pradesh. In 1951 he became the first student from his village to pass High School from Rastogi School (later K. R. Rastogi Inter College), Farrukhabad. While studying for his Intermediate certificate, VNM privately studied for the *Visharad* examination of Hindi Sahitya Sammelan, Allahabad and passed it in the first division.



V.N. Misra

After passing the Intermediate examination in 1953, VNM joined the D.A.V. College, Kanpur (then affiliated to Agra University) in the same year to study for the B.A. degree. His Hindi teacher, Pt. Brahmanand Shastri, encouraged him to continue his studies and helped him to get admission into the college. And to continue his studies in Sanskrit, a subject he had studied during the Intermediate, Shastriji arranged for VNM to join a Sanskrit Vidyalaya and stay in its hostel. His Sanskrit teacher, the late Pt. Vaikunth Nath Shastri, a very erudite scholar and an inspiring teacher, introduced VNM to his son, Kailas Nath Sharma who was head of the Dept. of Sociology at the DAV College, and later retired as professor of sociology from the Indian Institute of Technology, Kanpur. KNS persuaded VNM to study sociology as one of his subjects (the others being History and English literature). VNM passed his B.A. examination in 1955 in the first division, the only student in three colleges at Kanpur at that time to get this distinction. In 1954 he passed the *Prathama* certificate examination in Sanskrit from the Government Sanskrit College, Banaras (now Sampurnanand Sanskrit University, Varanasi). He stood first among all the successful students and won a four-year government scholarship to pursue further studies in Sanskrit.

After the B.A. results were out, K. N. Sharma advised VNM to study Anthropology for his M.A. at Lucknow University where the Department was headed by the renowned anthropologist Prof. D. N. Majumdar. Accordingly, VNM joined Lucknow University in 1955. In recognition of his performance at the B.A. examination, he got Bursary scholarship of Lucknow University for two years. He passed the M.A. examination in 1957 in the first division, and stood first in order of merit in his class. For this performance he won the Pandit Jagpal Krishna Gold Medal. During this period he also passed the *Purva Madhyama* examination in Sanskrit from the Government Sanskrit College, Banaras.



K.N. Sharma

During his M.A. course, VNM, along with all other students of his class, carried out two weeks compulsory field work in the tribal village of Jharo in Dudhi tahsil of Mirzapur district. Immediately after his M.A. examination was over, Majumdar dispatched VNM and his classmate, J.S. Bhandari, to do field work among the tribal communities in Dudhi tahsil. He spent two months (during May-July) collecting data on social and economic organization of the tribes like Gonds, Kharwars, Cheros and Korwas, the last an Austro-Asiatic speaking community and one of the most primitive tribes in India.



D.N. Majumdar

II. Entry into Archaeology: Field Work in Rajasthan

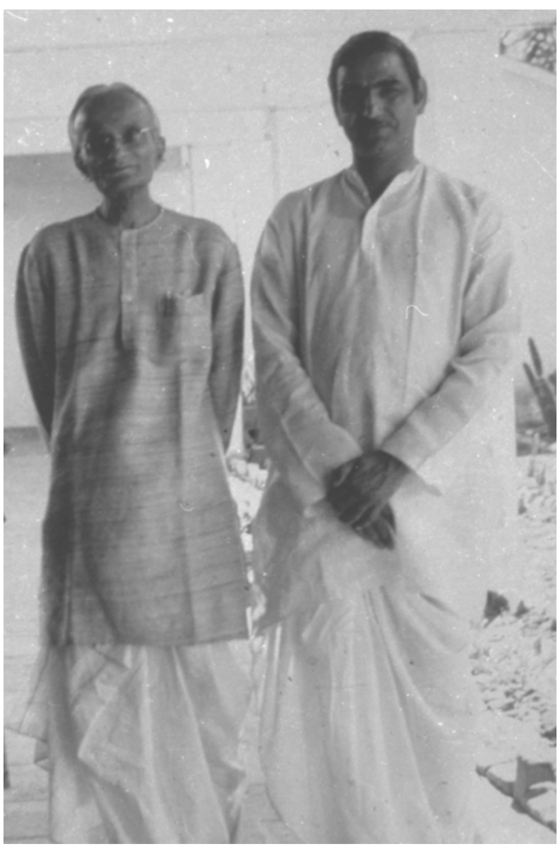
After he returned from field work in July, VNM was appointed as a lecturer in the Anthropology department, and had to teach Prehistoric Archaeology and Social Anthropology to B.A. and M.A. students. As there was no properly qualified teacher to teach prehistory, Majumdar advised VNM to go to Deccan College (short for Deccan College Post-Graduate & Research Institute), Pune and do Ph.D. in prehistory under the guidance of the eminent archaeologist, H.D. Sankalia, and come back to Lucknow to teach this branch. Accordingly, VNM went to Pune in June 1958 on a monthly scholarship of Rs. 80/- offered by the Deccan College. After sometime he got the newly instituted U.G.C. research scholarship of Rs. 150/- per month. At Lucknow VNM had read Vincent Smith's article on A.C.L. Carlleyle's discoveries of Mesolithic material and rock paintings in Mirzapur district of Uttar Pradesh (U.P.), and Grahame Clark's books *Mesolithic Age in Britain* and *Mesolithic Settlement of Northern Europe*, and was attracted to this period. He wanted to work on the Mesolithic of Mirzapur for his Ph.D., but to avoid misunderstanding with Prof. G.R. Sharma of Allahabad University, who was working in the same general area, Sankalia advised VNM to work in Rajasthan which was virtually a *terra incognita* for prehistory.



H.D. Sankalia

VNM participated in Sankalia's excavation of the Chalcolithic site of Navdatoli in Madhya Pradesh during December, 1958, and from there proceeded to Chittaurgarh in Rajasthan in January, 1959, and explored Palaeolithic sites in the Gambhiri and Berach rivers. From Chittaurgarh (Chitorgarh) he went to Pali in western Rajasthan (across the Aravalli hills) to explore the river Luni and its tributaries. In those days stone age research was done almost exclusively in river valleys because rivers provided naturally exposed geological deposits in which one could find stone tools and animal fossils in stratified contexts, and from which one could attempt a reconstruction of past climates and landforms. VNM carried out field

work in this area as well as the valleys of the river Banas and its tributaries in eastern Rajasthan for three successive seasons and discovered 14 Lower Palaeolithic, 18 Middle Palaeolithic (the latter mostly in the Luni basin) and four Mesolithic sites, besides examining a number of other Palaeolithic and Mesolithic sites which had been discovered by M.N. Deshpande, S. R. Rao and K.N. Puri of the Archaeological Survey of India (ASI) in valleys of the Chambal and Banas rivers and their tributaries around Chittaurhgarh. The artefactual material and Quaternary geological observations formed a part of VNM's Ph.D. dissertation, entitled *Stone Age Cultures of Rajputana* prepared under the guidance of H.D. Sankalia and submitted to Poona University in July 1961. The dissertation was examined by the late F.E. Zeuner and C.B.M. McBurney of the Institute of Archaeology, University of London, and Cambridge University, respectively, and he got his degree in 1962. While preparing his dissertation, VNM wrote a comprehensive article on the Palaeolithic industry of western Rajputana (as Rajasthan was called then). This was published in Vol. 21 of the Bulletin of the Deccan College in 1962.

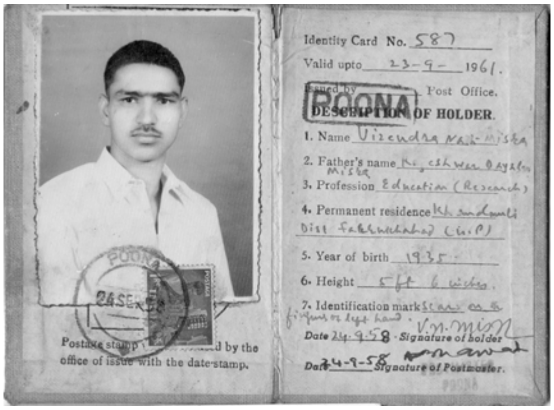


V.N. Misra with his *guru* H.D. Sankalia at Deccan College 1981

VNM recalls many experiences of his field work. In those days transport system in Rajasthan was very poorly developed. Only important towns were connected by bus, and often VNM had to travel by train at odd times, including in the night, and wait at small stations till sunrise to be able to walk to the river bed for exploration. He would stay in *dharamshalas* (inns) where the rooms often had no doors, *panchayat* offices, schools, etc. Luckily, his things were never stolen and the people he met were generally very helpful and hospitable. Most Indians, especially in rural areas, have a peculiar habit of making personal enquiries from any person they meet the first time. VNM was also often asked who he was, where and to what caste he belonged, and what he was doing in the countryside of Rajasthan. When he told about his search for prehistoric remains and his education, quite a few persons thought that he was bluffing; some thought that he was looking for herbal medicinal plants. The popular image of a highly educated person in rural India, at least in the 1950s, when for an educated person finding employment was not a problem, was that he should be having a well-paid and comfortable job in a city. The rural people found it impossible to believe that a person holding an M.A. degree should be wandering alone through sandy river beds in seasons of extreme heat and cold. Even many well-educated people have little idea of archaeology. One senior engineer of the Rajasthan (now Indira Gandhi) Canal directly asked VNM why the Government was wasting money on a non-productive subject like archaeology.

VNM would eat whatever food he could get. The worst problem was of water, particularly in western Rajasthan, where settlement are located at long distances, water is scarce and often brackish. On many occasions the water that he carried to the field would run out and he would be forced to drink highly brackish and unclean water from pools in the river beds. Much later he learnt that this stagnant water harboured hookworm which would get into the body of a person along with water, grow inside the body to considerable length and finally burst its way out from some part of the body. It had to be slowly pulled out causing enormous pain to the person. Because of the polluted water this was a common ailment in that part of Rajasthan. Luckily VNM did not get this painful disease. He still remembers the joy and excitement he felt after finding the first stone tools in the Luni bed, because he was not at all sure of

finding anything in the waterless region of western Rajasthan.



Identity card of V.N. Misra as a Ph.D. student 1958

Besides the happiness of finding stone tools in the semi-arid region of Marwar, VNM was lucky on another count. He had given copies of his dissertation for binding to a binder in Deccan Gymkhana area and had brought them back on the evening of 11th July 1961. Early next morning the newly built Panshet dam burst and large parts of Poona city, including the shop where he had given his dissertation for binding, were submerged under deep water. Had he not collected the copies the previous evening, they would have been washed away by the flood, and it would have been a disaster for VNM because he would have to prepare the dissertation once again for which he had no financial resources, and the job promised by Majumdar at Lucknow will also be in jeopardy.


V.N. Misra sitting on a gravel cliff of the Reria river, Pali district, Rajasthan 1959.

III. Back to Lucknow University

While VNM was doing his Ph.D., Sankalia offered him a lecturer's job at the Deccan College but VNM gratefully declined it because he was committed to Majumdar to go back to Lucknow. To VNM's ill luck, Majumdar suddenly expired on 31st May 1961, and now a blank future stared VNM in the face. In this hour of crisis, K.S. Mathur, VNM's colleague at Lucknow during 1957-58, appeared as a divine figure. He wrote to VNM that he was aware of DNM's promise of a job to him (VNM) at Lucknow University, and he would see to it that VNM gets one. Mathur kept his promise and VNM got an Assistant Professor's job at Lucknow University and joined it on 15th July 1961.

IV. Pune again

Meanwhile, University Grants Commission (UGC) created a new lecturership (in Prehistoric Archaeology) in Pune University's Department of Archaeology located at the Deccan College and headed by Sankalia. Sankalia offered this job to VNM who gratefully accepted it, and after spending one academic year at Lucknow, joined it on 26 July, 1962. VNM preferred Pune to Lucknow because of better research facilities and atmosphere, and also because after Majumdar's death his commitment for Lucknow was over. In 1968 he became a Reader and Head of the Department and continued in those posts until 1981 when he joined the Deccan College. During this period, besides doing teaching and research, VNM passed the certificate course examinations in French and German from Poona University and Max Mueller Bhavan (Goethe Institute), respectively in 1966 and 1971, both in first division, and also did a course in Russian in Poona University.

V. Further field work in Rajasthan

Immediately after joining the Deccan College, VNM spent two months (September-October, 1962) at the Indian Museum, Calcutta, and examined all the stone age collections there. Of particular interest were the collections of ground stone tools from northeast India which were totally different from those of peninsular India.

After that he resumed field work in Rajasthan, and this time concentrated on the Berach basin in Mewar, particularly the districts of Udaipur, Chittaurgarh and Bhilwara. He discovered a number of Lower and Middle Palaeolithic,

Mesolithic and Chalcolithic sites in the valleys of the Berach, Gambhiri and Wagan rivers. Microlithic sites were quite common and occurred on rocky ground where raw material – crypto-crystalline silica and quartz – was available. Chalcolithic sites, which belonged to the Ahar Culture, at that time known only from the excavated sites of Ahar and Gilund, and a few sites discovered by K.N. Puri of the Archaeological Survey of India (ASI), were located both along the river banks and away from them. These were characterized by, among other elements, painted Black-and-Red Ware (BRW), Tan Ware, which had distinct Harappan affinity, and a Thin Red Ware, all of very high quality.

VI. Exploration in U.P.

During 1964-65 VNM analyzed the material from Rajasthan field work and wrote several articles for different journals (see list of publications in P.P. Joglekar's paper) and a monograph entitled *Pre and Protohistory of the Berach Basin, Southeast Rajasthan*, which was published by the Deccan College in 1967. He also participated in the prehistoric explorations in the Narmada valley and in the excavations at the Neolithic site of Tekkalakota in Karnataka and the early historic site of Tripuri in Madhya Pradesh, all under the leadership of H.D. Sankalia. During the summer vacation (May-June) when VNM used to go to his home in U.P., he explored several sites of the enigmatic copper hoards as well Painted Grey Ware (PGW) and later cultures in Hardoi, Farrukhabad, Shahjahanpur, and Kanpur districts. Through enquiries from local persons he found out that copper hoards at sites like Dhaka, Sarthauli, Indilapur, Sheorajpur, Nakrahiya and Madnapur were found during activities like ploughing, canal digging, ground leveling, and just casual digging, and they were not associated with habitation sites. He also explored PGW and related sites at Kampil, Farrukhabad, and Sankisa in Farrukhabad district, Jajmau in Kanpur district, and Shampur in Hordoi district.

VII. Exploration in Gujarat and Rajasthan

In 1966 VNM and L.S. Leshnik of the Heidelberg University, West Germany carried out extensive explorations in Rajasthan and Gujarat, mainly to test Leshnik's hypothesis that early agriculture may have begun in the foothill region of the Aravalli mountains. During the explorations, apart from many small microlithic and later sites, they discovered two important Mesolithic sites at Tilwara in Barmer district in western Rajasthan, and Bagor in Bhilwara district in eastern Rajasthan. As trial digs at these sites proved promising, in the following four years VNM excavated them on a larger scale jointly with the Department of Archaeology and Museums of the Rajasthan Government, Jaipur.

VIII. Excavation at Tilwara

The site of Tilwara is located on a low sand dune about two km away from the southern bank of the Luni river at the eastern edge of the Thar desert. To reach the site the excavation team members (comprising VNM, C.G. Padval and Lakshaman Matal from Pune, and Vijay Kumar and H.C. Mishra from Jaipur) had to travel by train to Balotra and from there walk several km through the wide sandy bed of the river and wade through the wide stretch of shallow water which was biting cold in winter. For all the purchases one member of the team had to go to Balotra at least twice a week. The team stayed in the Government Dak Bungalow and had to walk about three km to the site and back every day. The site which had a deposit of only 60 cm yielded a rich and highly evolved geometric microlithic industry made on chert and quartz in the lower levels and microliths associated with wheel made pottery and iron tools in the upper levels. The evidence showed that in this backwater region use of microliths persisted well into historic period.

IX. Excavation at Bagor

The site of Bagor is located on a low dune on the left bank of the Kothari river, about one km east of the large village of Bagor. The site is known as *Mahasati* because Rajput women committed *sati* (immolated themselves on the pyres of their husbands) here and Shiva shrines have been built on those spots. With the help of Satya Prakash, Director of Archaeology and Museums, Rajasthan, the excavation team (comprising same members as at Tilwara) got accommodation in the Mica Welfare Centre inside the village. Mangi Lal Sharma, a local Congress worker and a very resourceful person, was of great help in arranging labour and solving all kinds of problems. At his initiative the workers in the excavation would host a feast of traditional Mewari dishes, which they themselves prepared, to the excavation team at the end of each season's excavation, and later would carry the team in a procession through the village accompanied by music and throwing of colour. VNM gets nostalgic while recalling the affection of

the simple village people. Some twenty years later, when, along with some of his colleagues of the Balathal excavation, he visited Bagor again, he was mobbed by the workers who spontaneously lifted him and danced with joy.

The site was excavated over an area of about 220 sq m for three years (1968-70), each year for about three months. Bagor remains the largest Mesolithic site excavated so far in India.

VNM recalls that they used to prepare the site for photography the previous evening, and next morning in the chilly winter he will reach the site before sunrise to take photographs before long shadows fell on the excavated trench. Lakshman Matal was an excellent cook and an extraordinary person. He derived greatest happiness by making other people happy. He would entertain every visitor to the camp with tea and snacks. Sometimes he would carry evening snacks to the site and would meet the team midway as it was returning to the camp. He would insist that the team members eat the snacks at a well in a field lest they get cold.

The cultural sequence of the site was divided into three phases. Phase I yielded a microlithic industry, animal bones, and one human burial containing an adult skeleton laid in an extended position. Phase II yielded, besides microlithic industry and animal bones, handmade and poorly baked pottery decorated with incised designs, and three human burials with the body buried in a flexed position. With the burials copper objects, complete clay pots, beads of semi-precious stones and bone, and animal bones, originally probably placed as chunks of meat, were found as offerings. In Phase III microlithic industry and animal bones declined in quantity, and wheel made pottery of the early historic period and iron tools appeared. Bagor was the first archaeological site in India from which entire animal bone material was collected. It was systematically studied by P.K. Thomas who got his Ph.D. degree on the study.

Bagor has provided excellent evidence of the process of acculturation in prehistory. The first settlers at the site were primarily hunter-gatherers, but were also herding sheep/goat and breeding cattle. With the passage of time the role of hunting declined and that of domestic animals increased. At a later stage the hunter-gatherers came into contact with settled farming people from whom they obtained pottery, copper objects, and stone and bone beads. And finally, they came into contact with iron using people and learnt the use of iron tools and weapons and wheel made pottery. It is by this process that most of India’s stone age hunter-gatherers have been assimilated into the mainstream society.

X. Sri Lanka

In 1969 VNM participated in the Second International Conference of Asian Archaeology organized by the Sri Lankan Government’s Department of Archaeology at Colombo, and presented a paper on his work at Bagor. He was also able to visit the famous Sri Lankan Mesolithic sites of Beli Lena Athula, Beli Lena Kitugala, and Batadomba Lena, and made friendship with Siran Deraniagala who later distinguished himself as the leading archaeologist of Sri Lanka. VNM again visited Sri Lanka in 1990 to participate in the international conference organized by the Department of Archaeology of the Sri Lanka Government to celebrate the centenary of its foundation.

XI. Homi Bhabha Fellowship and Europe

In 1970 VNM was awarded a Homi Bhabha Fellowship to study European prehistory. He visited a large number of archaeology departments, museums and excavations, studied stone tool collections, and met many leading archaeologists in Israel, Italy, France, Germany, U.K., the Netherlands, Denmark, and Czechoslovakia. He gave lectures on Indian prehistory at several places, and participated in Francois Bordes’ excavation at Pech de l’Aze and Henry de Lumley’s excavation at Grotte de Lazaret in France. As French prehistory is largely cave prehistory, in France VNM was often asked whether there were caves in India, and if so, he should look for evidence of prehistoric occupation there. He returned to India with a determination to look for and excavate a cave site. On completion of the fellowship VNM prepared a monograph on *Mesolithic Age in India*, and submitted it to Homi Bhabha Fellowships Council.

XII. Bhimbetka

After his return from Europe VNM was continuously thinking of excavating a stone age cave site. The opportunity came in 1972 when V.S. Wakankar, who had discovered the site of Bhimbetka in 1957, wanted to excavate it and requested H.D. Sankalia for Deccan College to collaborate in the project. Sankalia asked VNM to

undertake the excavation on behalf of the Deccan College.



A part of Bhimbetka hill, the shelters are at the bottom of the monolithic rocks 1973

Bhimbetka (70° 37' E: 22° 50' N) is name of a hill and archaeological site complex in Raisen district of Madhya Pradesh. The name is derived from Bhima, one of the Pandava heroes of the Mahabharata epic, who, according to local belief, spent some time in the caves on the hill during the period of their exile. The hill is situated about 45 km south of Bhopal and 35 km north of Hoshangabad, and about two km south of the tribal village of Bhiyanpur which is located on the southern side of the Mumbai-Delhi rail line and highway running parallel to it. The hill possesses over 200 caves and rockshelters, some of which contain evidence of occupation by stone age man and almost all of them contain paintings dating from the stone age to historical period. Several other hills in the vicinity of Bhimbetka also contain caves and rockshelters and the total number of these in the area is over 1000. The caves and rockshelters have been formed by natural weathering in the soft Vindhyan sandstone. The hills and valleys are covered by a fairly thick dry deciduous vegetation, which contains over 30 species of trees, plants and creepers having edible leaves, flowers, fruits, seeds, roots and tubers. The forest also harbours a rich wildlife, including herbivores as well as carnivores. A seasonal stream flows by the eastern edge of the hill and a number of perennial springs are found in the vicinity of the hill. The stream and the springs meet the water needs of human as well as animal (both wild and domesticated) populations. The tribal people, mainly Gonds, principal inhabitants of the area, extensively exploit the wild plant food resources. Bhimbetka thus has all the ingredients – food, water and shelter – required to sustain a hunting-gathering way of life, and it is no surprise that stone age hunter-gatherers inhabited the area for at least a hundred thousand years and probably more.

Wakankar and Yashodhar Mathpal, who carried out comprehensive studies of the rock art of the site, classified the shelters into a three-tiered scheme. The first tier consists of eight main groups or areas which have been numbered I-VIII. Each area has been divided into subareas or clusters which have been numbered A, B, C, etc. And in each cluster the shelters have been numbered 1, 2, 3, etc. Thus each shelter bears a three-tier number, for example, IIIF-23. In 1972 V.S. Wakankar began excavation at the site and dug in several shelters for five seasons. In 1973 V.N. Misra, assisted by research scholars Yashodhar Mathpal, P.K. Thomas, S.C. Nanda, D.R. Raju, Makkhan Lal and Nivedita Boga, and several members of the technical staff, started excavation and dug three shelters, namely IIIF-23, IIIF-13, and IIB-33 for five seasons.

VNM's camp was located inside the forest at the foot of the hill. In the evenings the camp inmates would sit around a big fire and have lively discussions on various archaeological topics in a very tranquil atmosphere. There was quite a bit of wildlife in the forest, and sambar, nilgai and wild boar would often visit the camp. There was also a large troupe of langurs whose agile jumping on the trees and other aspects of behaviour the camp inmates often got to watch. Snakes, including cobras, posed a serious danger and occasionally pythons were also sighted. Scorpions were very common and a big nuisance, and in the evenings when excavation team sat down on a carpet to catalogue the day's finds, they would make a ring of DDT around the carpet to prevent the scorpions from crawling on to it. Honey bees from numerous beehives were also a big nuisance.

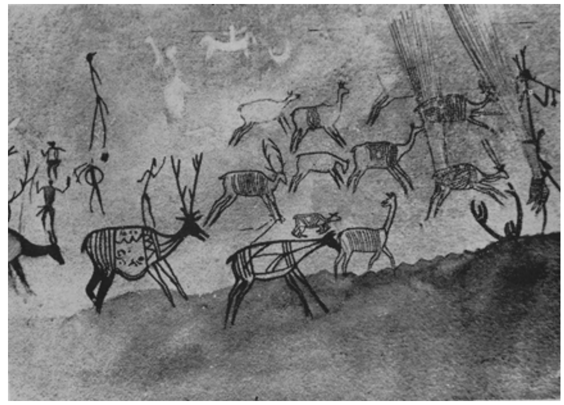


One of the shelters at Bhimbetka overlooking the green valley 1974

The site was located about two km from the road. The excavation team had no transport of their own. They would travel by train from Pune to Hoshangabad and by a government bus from there to Bhiyanpur, and then walk the two km distance to the site. Bhiyanpur, being a small settlement of no consequence, was not a regular bus stop, and the driver will stop the bus only on the team members' request. The landmark for alighting from the bus was the railway gate. Sometimes the members arrived late in the night and their guess for locating the gate turned out to be misjudged. On such occasions the bus will overshoot the gate and the members will have to walk ahead or back to it. There was no well-defined path to the hill, and there were occasions when some of the team members would forget the path and get lost for hours and eventually locate the camp with the help of the white colour of the camp tents. The team members will leave their baggage in charge of the railway gateman, who was most cooperative, and send one of the workers in the morning to bring it to the camp. Written instructions to this effect were sent to all would be visitors to the site. For carrying the camp equipment from the road to the camp the team will hire bullock carts. For the cart to reach the camp the team had to remove lots of rocks from the poorly defined track. They would mark the track on both sides by painting selected rocks in white as a guide for themselves and the visitors.

For water the team depended on the *nala* (seasonal stream). After it dried up in February-March, the excavators would dig a well in its bed. The water was not very clean and had to be boiled for consumption. Fortunately, none of camp inmates (there would be 15-20 of them at any time) nor any of the hundreds of visitors, including foreigners, developed any stomach problem.

The team would be camping at the site for 2-3 months every year. As the news of the excavation started appearing in the press, people from Bhopal and other nearby places started visiting the site, particularly on Sundays and other holidays. On these days some of team members would double up as guides and will spend several hours in giving lessons in elementary prehistory, explaining the excavation and stone tools, and showing the far-flung painted shelters to the visitors. This of course interfered with the excavation work but as archaeologists the excavators did not mind the sacrifice because it helped in creating an awareness about archaeology. Reports about the excavation in local Hindi newspapers as well as full-length articles by VNM in the *Indian Express* Daily and *Dharmayug*, a prestigious Hindi weekly, did a lot to popularize the site. Foreign press also gave a lot of coverage to rock paintings.



Hunters and their game, Mesolithic paintings at Bhimbetka 1975

A large number of archaeologists from universities and other institutions visited the site during excavations and some participated in them. The visitors included H.D. Sankalia, B.B. Lal, M.N. Deshpande, G.R. Sharma, D.P. Agrawal, S.P. Gupta, T.C. Sharma, V.D. Misra, R.K. Varma, K.T. Reddy and K.C. Tripathy. Foreign archaeologists, who visited the excavations, included professors Henry and M-A. de Lumley and Dr. J.R. Lukacs. In December 1978, about 50 archaeologists from North American, European, African, and Pacific countries, who had come to India to participate in the International conference of Anthropological and Ethnological Sciences at New Delhi and Indo-Pacific Prehistory Association symposium on Indo-Pacific prehistory at Deccan College, Pune, visited the site. Because of its setting in a forest, comparatively easy accessibility, rich rock art, and visits of many scholars during his excavations, VNM regards Bhimbetka as the most memorable of his excavation camps.

The major findings of the excavations in three shelters are briefly summarized below.

XIIa. III F-23

An area of 52 sq. m was excavated in this shelter, and a maximum deposit of 3.80 m was encountered. The shelter yielded an unbroken cultural sequence from Late Acheulian to the transition from Mesolithic to Chalcolithic and finally to Iron Age.

Layers 1-3 yielded Mesolithic material. Layer 1 produced a geometric microlithic industry made on chalcedonic silica, a small quantity of quartzite flakes, blades and microblades, hammers, grinders and querns of basalt, occasional stone beads, small quantity of highly fragmentary plain red and grey pottery, and rare bone pieces. Layer 2 had cultural material similar to layer 1 but without pottery and beads, and its stone industry was richer than that of layer 1. In layer 3 the microlithic industry was quantitatively smaller.

Layer 4 had no microliths but contained quartzite flakes, blades and scrapers of Upper Palaeolithic or late Middle Palaeolithic type. Layer 5 yielded a typical Middle Palaeolithic assemblage comprising Levallois flakes, blades, a wide variety of side scrapers, a few end scrapers and rare bifaces. Layers 6-8 yielded a typical Late Acheulian assemblage.

Palaeolithic assemblages are made of orthoquartzite. Heavy duty tools, like bifaces, were made of tough, dark quartzite while light duty tools like scrapers and points, were made of soft, yellowish quartzite. The Acheulian industry is dominated by flake tools like scrapers, points, and denticulates which account for nearly 88% of the collection while bifaces constitute only 12%. The ratio of cleavers to handaxes is 3:1. All the cleavers and most of the handaxes are made on flakes. Over 12% of all flakes are made by the Levallois technique. The Middle Palaeolithic industry develops *in situ* out of the Acheulian, and is characterized by a variety of flake tools like scrapers, points, denticulates and notches though bifaces continue in the early phase. The Levallois technique continues to be dominant but a sizable proportion of the scrapers are made on natural flat pieces of rock. The Upper Palaeolithic period is a continuation of, but shorter than, the Middle Palaeolithic. Its significant new features are a high percentage and more typical nature of end scrapers, and the appearance of short, thin blades, microblades and occasional burins.

Next to the Acheulian culture, the evidence for the Mesolithic at Bhimbetka is very rich. This was found in all the three shelters dug by VNM.

XIIb. IIIF-13

This shelter is located on the main Bhimbetka hill about 100 m to the southeast of IIIF-23. It has a floor area of about 500 sq. m, and a habitation deposit of about 60 cm. Four layers were recognized in the deposit and in the upper three layers a number of ashy patches of 25-30 cm diameter were observed. The top two layers were rich in microliths and contained plain grey and red potsherds. Microliths were fewer in layers 3-4, and pottery was absent. The microlithic industry of this shelter differs from that of IIIF-23 by the absence of large blades.

One incomplete and poorly preserved human burial, laid in a flexed position, was found in layer 2. A second burial consisted of only a few fragments of the skull.

XIIc. Shelter IIB-33

This shelter is located about one km to the southeast of the main Bhimbetka hill. It had only Mesolithic deposit which was nearly 1.50 m thick and consisted of five layers. Layers 1-2 yielded a microlithic industry and plain grey and red potsherds. Layer 3 yielded a rich microlithic industry, and Chalcolithic potsherds, the latter only in the upper part. Two human burials, laid in an extended position, were found in this layer. Layer 4 had no pottery and fewer microliths. It yielded three human burials.

This shelter had the maximum Mesolithic deposit at Bhimbetka, and the microlithic industry showed evolution in respect of reduction in the size of blades and more systematically produced microliths. All the burials were laid in an extended and supine position, and were poorly preserved. Grinding stones, ground haematite pieces, antler pieces, and bone tools were placed with the burials as grave goods.

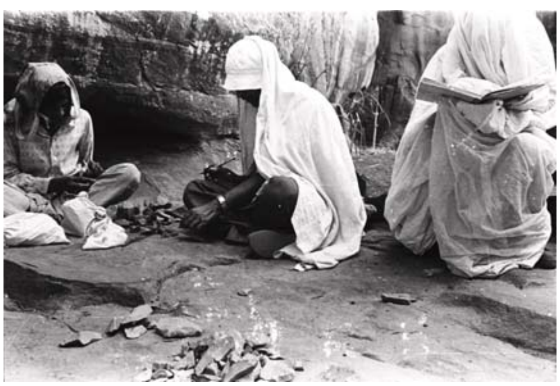


Enacting stone tool making in a shelter at Bhimbetka 1974

Radiocarbon dates for Upper Palaeolithic and Mesolithic occupation at Bhimbetka range from *c.*

17,000 BP to c. 2000 BP (uncalibrated). Besides, cave occupations there are also a number of rich open air Palaeolithic sites at and around Bhimbetka.

In addition to its stone age habitation deposits, Bhimbetka is known for its rich wealth of ancient paintings, which has made it a major tourist attraction. The paintings are found on the walls and ceilings and in the niches of the shelters. They are made mostly in red and white pigments and occasionally also in yellow and green. Although a number of chronological stages have been recognized by different investigators, broadly the paintings can be divided into two stages: Prehistoric and Historic. The paintings of the first stage are dominated by wild animals and hunting scenes. Less frequently scenes of fishing, plant food collecting, honey collecting, and ceremonial and religious subjects are also shown. These paintings are remarkably naturalistic and are marked by vitality and vigour. Paintings of the later period are of a stylized nature and mainly depict processions with men riding caparisoned horses and elephants, and battle scenes in which warriors fight with spears, swords, shields, and bows and arrows. Haematite nodules were ground to produce pigment for making paintings. The presence of such nodules with ground facets in habitation deposits on the floors of the shelters provides clear proof that the paintings were made by the people who dwelt in the shelters.



Archaeologists examining stone tools at Bhimbetka (V.N. Misra in the centre). They are covered with cloth as a protection against the menace of honey bees 1976

Eventually, as the fame of Bhimbetka grew, and tourist traffic increased, the Madhya Pradesh government built a metalled road from the highway to the site (several years after the excavations were over) and one can now comfortably reach the site right up to the mouth of some of the main caves by one's own transport.

XIII. Australia and Indo-Pacific Prehistory Association (IPPA)

In 1969 Jack Golson of the Australian National University (ANU), Canberra, while on his way to U.K., made a brief visit to Pune, and discussed with H.D. Sankalia and VNM the question of possible relationship between Australian and Indian microlithic industries and between the Australian dingo and Indian pariah dog. Next year Golson invited VNM to present a paper on Indian microlithic industries at the eighth meeting of the Far Eastern Prehistory Association (FEPA), which was to be held in January, 1971 at ANU, under the auspices of the 28th International Congress of Orientalists. VNM and several other Indian archaeologists like B.B. Lal, A.K. Narain, D.P. Agrawal and A.K. Ghosh participated in the meeting. At this meeting it was suggested by W.G. Solheim, President of FEPA and other scholars that South Asian archaeologists should actively participate in FEPA activities, and to express this enlarged geographical scope of the Association the name of FEPA should be changed to Indo-Pacific Prehistory Association (IPPA). The idea was further discussed during a nearly two-week tour of Australian archaeological sites that covered the states of Victoria, Southern Australia, New South Wales, Western Australia and Tasmania. The new name and constitution were formally approved at the ninth meeting of FEPA which was held under the auspices of the ninth Congress of the International Union of Prehistoric and Protohistoric Sciences at Nice. At this meeting VNM was elected as a member of the IPPA executive. He offered to host the first conference of IPPA at Deccan College, Pune in December 1978 as a part of, and immediately after, the IXth Conference of the International Union of Anthropological and Ethnological Sciences which was scheduled to be held at New Delhi in the same month. VNM was Vice-President of IPPA during 1981-84 and President during 1985-88.

During his stay at Canberra and the long archaeological tour of Australia VNM had an opportunity to meet and make friends with many archaeologists from a large number of countries, particularly Australia. Notable among them were D.J. Mulvaney, Jack Golson, Isabel McBryde, Rhys Jones, Betty Meehan, Colin Groves, and

Peter Bellwood from Australia, and W.G. Solheim from the USA

XIV. Leverhulme Visiting Fellowship and Australia again

In 1975 D.J. Mulvaney was instrumental in VNM being offered the Leverhulme Visiting Fellowship at the ANU, which he availed during July-December 1977. The fellowship gave VNM an opportunity to examine rich stone tool and ethnographic collections in many museums in New South Wales, South Australia, and Western Australia; visit a number of archaeological sites, including a second visit to Lake Mungo and other sites in the Willandra Lake system, participate in several conferences, including one on the conservation of rock art at Perth, and visit a large number of rock art sites in Western Australia as part of a tour which followed the conference. On this tour the participants included an aboriginal artist, who knew the mythology behind the rock art very well, and acted as a very informative guide. VNM also gave lectures on Indian prehistory, including rock art, at Canberra and other places. He also took advantage of the visit to discuss the planning of the IPPA symposium to be held at Pune in 1978, with a number of archaeologists, including Jack Golson, John Mulvaney, Rhys Jones, and Isabel McBryde.

XV. Back to Rajasthan

In 1977, mainly because of the insistence of his close friend, D.P. Agarwal of Physical Research Laboratory (PRL), Ahmedabad, VNM, along with his geologist colleague, S.N. Rajaguru, resumed research in Rajasthan, this time mainly to understand the evolution of the environment of the semi-arid and arid region, known as Thar desert, on the western side of the Aravallis. They enlisted the cooperation of R.P. Dhir, a well known pedologist of the Central Arid Zone Research Institute (CAZRI) of Jodhpur. This project lasted for eight years. Every year VNM and Rajaguru, along with some of the other members of the research team like P.K. Thomas, D.R. Raju, S.C. Nanda, Makkhan Lal, and Hema Raghavan, would travel by road to Jodhpur, stopping on the way for a day or two at PRL for discussions with D.P. Agrawal and his colleagues, and camping for a few days at CAZRI for discussions with R.P. Dhir and his colleagues. In the initial years of the project VNM's team also had collaboration with the Jaipur branch of the Geological Survey of India (GSI) whose Director, Subroto Sinha and a number of his younger colleagues participated in the field work. In 1980 the team was joined by Gurdip Singh, well-known palynologist, and R.J. Wasson, geomorphologist, both of ANU, Canberra for participation in field work. Wasson's main interest was in the study of the morphology and formation processes of the sand dunes, and he was very happy to visit and study the dune fields of the Thar. Ms. Claire Gaillard, a prehistorian from the Institut de Paleontologie Humaine at Paris, took active part in the excavation of the Acheulian site of Singi Talav at Didwana.

The team carried out extensive exploration over a large part of the semi-arid and arid zone in the districts of Sirohi, Jalore, Pali, Ajmer, Jodhpur, Nagaur, Barmer, Jaisalmer, and Bikaner, and studied the morphology of sand dunes, examined colluvial and alluvial deposits, and located a number of Palaeolithic and Mesolithic sites. Most of their intensive work was concentrated around the Didwana town in Nagaur district. Except in the vicinity of Aravalli hills, the entire region to the west of these hills is covered by sand sheets and sand dunes, their size steadily increasing as one proceeds away from the hills towards the west and north. In his earlier explorations VNM had looked for archaeological material in river beds and sections, and on rock outcrops. This time he looked for it in colluvial deposits and on sand dunes away from rivers. A new and important field of Palaeolithic research was opened when Bimal Ghose, a geomorphologist at CAZRI, showed VNM and Rajaguru some stone tools which he had found near Jayal in Nagaur district. When Rajaguru and VNM visited the place, they were surprised to find an extensive and unusually thick deposit of heavily rolled boulders and pebbles in an area which was several hundred km away from any river that could have formed it. Subsequent exploration led to the discovery of many Palaeolithic sites on this gravel ridge between Jayal and Didwana.

Western Rajasthan has a large number of lakes which are dry today but were carrying fresh water in the past. In the 1960s Gurdip Singh had studied the sediments of three of these lakes, namely Sambhar, Didwana, and Lunkaransar, and found that below the surface they contained a dark black, finely laminated clay deposit which was rich in pollen grains. From the study of pollen he deduced that in the past the region of the lakes enjoyed a much higher rainfall when the pollen rich clay was

deposited. Subsequently, the climate became dry and sandy deposit was formed over the clays.

In 1980 during a visit to Didwana lake with Singh, Wasson and Rajaguru VNM noticed a quarry in a depression known as Singi Talav which is separated from the lake by a large dune. On examination he found Acheulian tools in extremely fresh condition lying on the surface of the quarry and exposed in the cliffs. Further explorations in the region led to the discovery of many quarries which yielded Acheulian as well as Middle and Upper Palaeolithic tools. The deposit of the quarries consists of a calcareous loam which is quarried by the Public Works Department for spreading along road sides, and by the village people for making lime by burning it, as well as for making house floors, and as mortar for joining stones in the construction of houses and other structures. Microliths were found on the surface of virtually every dune in the desert.

In addition to the explorations, the team also carried out excavations at Jayal, Chhajoli, Singi Talav, Indola-ki-Dhani, Bangar Canal and in Didwana lake. These are briefly described below.

XVa. Jayal

The site is located about two km to the south of the town of Jayal (27° 13' N; 74° 11' E). Four 1 m sq. trenches were dug on the top and slopes of the gravel ridge. Lower Palaeolithic artefacts comprising choppers, chopping tools, scrapers, handaxes, flakes and cores, made of quartzite, were found in 40 cm thick gravel deposit 60 cm below the surface. The absence of cleavers and Levallois flakes suggests the assemblage to be early Acheulian.

XVb. Chhajoli

Three small trenches were dug on the gravel ridge near Chhajoli village, two km southwest of the Jayal trenches. Lower Palaeolithic artefacts similar to those of Jayal were found in the gravel at 1.10-1.30 m, 1.50-1.80m, and 1.90-2.30 m depths below the surface.

XVc. Singi Talav

Singi Talav is a large shallow depression about two km west of Didwana town. There is a large loam quarry at the southeastern edge of the depression. In the sections of the quarry as well on its floor many fresh Acheulian artefacts can be seen. Four trenches of 4 x 4 m were dug in the loam at the eastern and northern edges of the quarry. Two cultural horizons were recognized: one between surface and 15 cm, and the other between 15 cm and 1.20 m. The assemblage of Horizon 1, marked by small flakes and flake tools, is Middle Palaeolithic while that of Horizon 2, characterized by handaxes, choppers, chopping tools and polyhedrons, represents an early stage of the Acheulian. Concentration of artefacts between 40 cm and 80 cm depth from the surface and presence of a hard calcrete layer below 80 cm suggests occupation on a dry land surface alongside a water course.

Five quartz crystals, showing some deliberate modification, found in this deposit, were probably brought to the site by man for their curiosity or aesthetic value.

The results of these digs and collections from the quarry sections showed that stone artefacts in the loam occur only in localized clusters. This clustering can only be due to human activity, and not to natural agencies; the latter would have produced a random distribution. Most of the artefacts are remarkably fresh, clearly showing that they were manufactured, used and discarded at the edge of a lake, pool or shallow stream channel, along which Acheulian groups camped, and got incorporated in the fine-grained sediments when water level rose during the rainy season. They are made of coarse to medium-grained quartzite and vein quartz which were quarried from the several hills in the area and occasionally obtained as pebbles from an exposure of the Jayal gravel ridge or an ancient stream bed exposed at that time.

Artefactual material from the excavations and from the debris of several tanks dug in the Amarpura loam shows two technological stages in the Acheulian industry: an earlier one consisting mainly of core tools comprising choppers, chopping tools, spheroids, polyhedrons, handaxes, cleavers, side scrapers, flakes and cores, and absence of Levallois technique; and a later and more developed one, characterized by smaller, thinner and more symmetrical handaxes, a larger proportion of flakes and flake tools, occasional cleavers, and the use of soft hammer and Levallois techniques of flaking.

XVd. Indola-ki-Dhani

At Indola-ki-Dhani, one km west of Singi Talav, digging was done in the loam deposit to a depth of

5.15 m, and it was divisible into six layers. Stone artefacts occurred in all the layers but a part of layers 4 and 5 (3.85-4.45 m) was sterile. Three archaeological horizons were recognized. Horizon 3 (4.46 – 5.05 m) yielded a very small and atypical assemblage. Horizon 2 (1.86 – 3.85 m) yielded a larger collection, comprising points, scrapers, choppers, chopping tools, polyhedrons, knives, and handaxes. The higher proportion of flake tools and smaller size of tools in comparison to those of Singi Talav suggests this assemblage to be late Acheulian in character.

XVe. Bangar Canal (16 R)

The most important geological deposit for understanding the climatic history of the Thar is sand dunes, which are broadly of two types: active ones, which are still being formed, and fossil or buried ones, which were formed in the past, and are now stable and covered by vegetation. The dunes were formed when the climate was dry and the wind activity strong, and they were stabilized when the climate was comparatively humid and wind activity low. The history of sand dune formation can be understood only by digging through the sand. But sand, being a loose deposit, is prone to collapsing during digging. Fortunately, VNM and Rajaguru found a dune in which the sand was quite compact and hard. During the famine of 1940-41 the Bangar family of Didwana had dug a canal through the dunes to bring monsoon water to a tank at Didwana. The canal and its banks are still well preserved. VNM and Rajaguru excavated a nearly 20 m deep stepped trench through the dune about two km west of Singi Talav. The excavated profile revealed several alternating horizons of loose and highly compacted sand, which represented phases of arid and humid climate, respectively. The profile also yielded stone assemblages of Lower, Middle and Upper Palaeolithic periods. It has been dated by D.P. Agrawal and A.K. Singhvi of PRL through radiocarbon, TL and Uranium/Thorium decay series techniques from about 400,000 BP to *c.* 6,000 BP. The 16 R excavation has made an unusually important contribution to our understanding the climatic and cultural history of the Thar desert.

VNM and his team dug two wells in the Didwana salt lake to collect samples for palynological and geochemical studies which were carried out by Gurdip Singh and R.J. Wasson, respectively. From these studies they reconstructed the climatic history of the lake over the last 15,000 years.

On the basis of the stratigraphic observations and finds of stone tools from explorations of the Jayal gravel ridge, loam quarries at Singi Talav, Amarpura and many other places, as also in wells, and on dune surfaces and rail road cuttings through dunes at numerous places, wells and trenches in saline playas, excavations mentioned above, and two specially dug wells in the Didwana lake, Rajaguru and VNM identified three Quaternary geological formations, namely Jayal, Amarpura and Didwana, the last consisting of two units – an earlier aeolian and a later lacustrine. The climatic, hydrological, landform and cultural history revealed by these formations can be briefly summarized as follows.



20 m deep trench in the sand dune at 16R, Didwana 1982

During the Neogene and early Quaternary the Thar region had an integrated and powerful drainage system which deposited the extensive and thick gravel beds of the Jayal Formation. Subsequently this formation was tectonically uplifted, and it assumed its present form of rolling topography through erosion. Neogene tectonic activity is believed to have disrupted the integrated drainage system, and replaced it with low energy, shallow

streams flowing through wide flood plains dotted with numerous lakes and playas. In these water bodies calcareous loam of the Amarpura formation was deposited extensively. Strong aeolian activity led to the formation of irregular linear and longitudinal dunes on the defunct flood plains. The dunes favoured the formation of pans in which marls and calcareous clays were deposited. The climate during this period was essentially semi-arid but it was interrupted by several episodes of increased rainfall which led to the stabilization of dunes.

Stone age human groups from the Early Acheulian stage onwards camped on the surface of the Jayal gravel ridge and exploited the abundant supply of quartzite for making their tools. They also camped along the shallow streams, lakes and pools in the flood plains, on low hills, and on stable dune surfaces. The artefacts from camps on hill tops and slopes were washed down by rainwater and got incorporated in the colluvium at the foot of the hills. Those from camps along streams, lakes and pools were incorporated in the marls or calcareous clayey deposits formed in these water bodies, and those of camps on dune surfaces got buried under fresh deposition of sand. In all these locations the artefacts have been preserved in a remarkably fresh condition.

Stone age sites of different stages have been found widely in the desert, as far west as Barmer and Jaisalmer, and Mesolithic sites have been found even in the Bikaner district.

During the Upper Pleistocene climate became more dry but there were periods of increased rainfall during the long dry period. These alternating dry and wet phases are represented in the form of loose and compact sand horizons in the Bangar canal profile. Streams kept shifting towards the west. A number of palaeochannels of varying sizes existing in the northwestern part of the desert testify to this. VNM and Rajaguru have located at least three extremely wide channels between Jaisalmer and Ramgarh, 110 km north of Jaisalmer. Along the northern bank of two of these channels Middle-to-Upper Palaeolithic artefacts were found near Sanu and Mokal villages.

Geochemical and palynological data from the Didwana and other salt lakes, and weathered horizons of the youngest dunes, in conjunction with C-14 and TL dates, show that climate began to ameliorate from around 15,000 BP, and there was a particularly significant increase in rainfall between 6,000 and 4,000 BP when lakes were full with fresh water. Plant and animal resources increased in response to enhanced rainfall, and more food resources led to a fast growth in human population. This is clearly reflected in the large number of microlithic sites all over the semi-arid and arid zone. In fact, if one climbs a dune almost anywhere in the desert and searches carefully, one is sure to find a few microliths and broken animal bone pieces.

During this long field work VNM had many memorable experiences. He fondly remembers the academic help and valuable suggestions given to him and his colleagues and hospitality extended to them by Drs. H.S. Mann and K.A. Shankarnarayan, successive directors of CAZRI, and their colleagues like Bimal Ghose, Sen, and Amal Kar. He is particularly grateful to the warm hospitality of Prof. D.P. Agrawal at PRL and of professors R.P. Dhir and Ishwar Prakash at CAZRI. He also met a number of nomadic hunting-gathering, entertaining, drug-dispensing, and other groups, and learnt a lot about the noble people and the rich culture of Rajasthan.

A number of Indian and foreign archaeologists visited Didwana and saw the excavations at Singi Talav and Bangar canal. Among the latter were Desmond Clark, Johan Kamminga, Martin Jones, and I.M. Crawford, the last three from the universities of ANU, La Trobe, and Western Australia.

XVI. Lucknow again, and Fulbright Fellowship

In 1983 VNM was offered a professorship in the Department of Anthropology at Lucknow University, and he joined it in September of the same year. However, he found the research facilities inadequate and the academic atmosphere not very conducive, and came back to Pune in August next year.

In the same year he was selected for a Senior Fulbright Fellowship, and he availed it during January-May 1984 at the Department of Anthropology, University of California (UC), Berkeley. During his visit he collected material on South Asian archaeology from library sources, and gave lectures on South Asian archaeology at several universities, including UC, Berkeley, Pennsylvania (Philadelphia), Virginia

(Charlottesville), Santa Cruz, Wisconsin (Milwaukee), Cornell (Ithaca), and Oregon (Eugene). The stay at Berkeley gave VNM an opportunity to have plenty of interaction with eminent scholars like J.D. Clark, Donald Johanson (of Lucy fame), Tim White, George Dales and several others.

XVII. Narmada Valley

Narmada valley, particularly its central part between Narsinghpur and Hoshangabad, has preserved thick alluvial deposits of Middle Pleistocene to Holocene. They are extremely rich in animal, particularly, mammalian fossils, and Palaeolithic and Mesolithic artefacts. A number of palaeontologists, geologists and archaeologists have investigated these deposits from 1830s onwards. Although a lot of archaeological material has been collected, few primary sites have been found. As regards human physical remains, they are represented by a single incomplete cranium found by Arun Sonakia at Hathnora near Hoshangabad.

During the mid 1960s VNM had participated in field work in the Narmada valley in a project led by H.D. Sankalia, and he was familiar with the known geological and archaeological history of the valley. In 1986, he, S.N. Rajaguru and G.L. Badam decided to carry out further investigations in the valley. Other participants in the project were R.K. Ganjoo, V.G. Sathe, Salahuddin and Shafiqul Alam. The objectives of the project were: a) to search for human fossils; b) reconstruct palaeoclimatic and palaeoenvironmental history of the region; and c) to relate stone tool industries with palaeoclimatic phases. The team worked for five seasons from 1986 to 1990, explored a large area in Narsinghpur district and discovered several Palaeolithic and Mesolitic sites, the most important being the Middle Palaeolithic site of Samnapur (23° 06’ 17” N; 79° 07’ 30” E) and the Mesolithic site of Kerpani (23° 04’ 37” N; 79° 09’ 30” E), both located on the Narmada river. The team concentrated its work around Devakachar village, located at the confluence of Sher and Varurewa rivers, both tributaries of the Narmada, and at Samnapur. Small excavations at Guarighat on the Sher and Talayaghat on the Varurewa in the gravelly sand belonging to the Upper Group of the Narmada stratigraphy, at the base of the exposed section, yielded rich Middle Palaeolithic to Upper Palaeolithic assemblages and fossils of a variety of animals.

A bigger excavation was carried out at Samnapur. The site is located on the topmost terrace of the Narmada where it abuts a cherty quartzite outcrop of the Vindhyan hills. The artefacts, which occur in a 50-70 cm thick rubble deposit buried under silt, have been exposed by erosion by rain water. They are remarkably fresh and are clearly in a primary context. The assemblage consists mainly of flakes and a variety of scrapers, knives and denticulates. The presence of many cores and flaking debris shows that the tools were manufactured at the site, and got buried under silt during an aggradational phase of the Narmada. The absence of bifaces, which occur in a deposit several metres below the rubble, as well as of Upper Palaeolithic and Mesolithic tools clearly shows the assemblage to be of Middle Palaeolithic age. The stone age people appear to have chosen the location for their camping because it was well above the normal flood level of the Narmada, was close to rich source of raw material in the cherty quartzite outcrop, and had easy access to the animal and plant food resources of the plateau and the flood plain. Samnapur is one of the few primary context Middle Palaeolithic sites in India.

XVIII. Excavation at Balathal

Balathal was one of the nine sites of the Ahar Chalcolithic culture which VNM had discovered in Mewar during his 1962-64 explorations. The question of excavating any of these sites did not arise as he got busy in other projects described above. However, in 1989 Rajasthan Vidyapeeth (a deemed university), Uaipur invited him to deliver Gourichand Hirachand Ojha Memorial lectures. On that occasion Vice-Chancellor of the Vidyapeeth, K.K. Vashisth expressed a desire to establish an archaeology department in his university and solicited VNM’s help. VNM told Vashisth that since archaeology was primarily a field science, the best way to train his staff would be to carry out a joint excavation by the Deccan College and the Vidyapeeth. After an examination of the sites discovered by VNM, Balathal was selected on the grounds that: (1) it would add to our knowledge of the Ahar culture which was till then mainly based on excavations of Ahar and Gilund; (2) was not too big and therefore manageable; (3) was fairly intact; and (4) was connected with Udaipur by a metalled road.

The site covers an area of about five acres and has a habitation deposit of about seven m. It was horizontally excavated for seven seasons (1994-

2000) by VNM, V.S, Shinde and R.K. Mohanty of the Deccan College, and Lalit Pandey and J. S. Kharakwal of the Rajasthan Vidyapeeth. They were assisted by a number of their colleagues, including M.D. Kajale, P.K. Thomas, P.P. Joglekar, Anupama Kshirsagar, and Arati Deshpande, several members of the technical staff, and a number of research scholars from the Deccan College. The finds from the excavation more than fulfilled the excavators' expectations. The excavations have produced evidence of two cultural periods, viz. Chalcolithic and Early Historic. They are separated by a sterile layer of about one metre thickness.

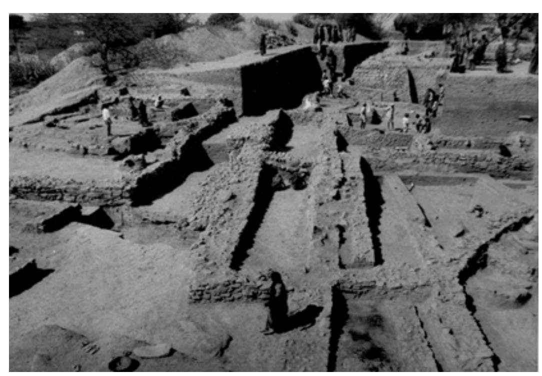
The Chalcolithic period, divisible into two phases, A and B, is characterized by rich evidence of architecture, ceramics, copper technology, terracotta objects, stone and steatite beads, and plentiful evidence of animal bones and plant remains. The architecture consists of residential structures in the outer area and a fortified enclosure in the centre of the settlement. It shows incipient planning as the three exposed residential complexes are divided by a 2 m wide street and a 1 m wide lane. Structures are made of stone, mud brick and mud and range from small single room houses to large multi-roomed complexes. The houses have overground and underground storage bins, kitchens with U-shaped *chulhas*, and grinding stones. The fortified enclosure is of roughly rectangular shape with walls measuring 37 m in east-west direction and 25 m in north-south direction. Their width ranges from 4.5 to 5 m and height from 3.5 to 4 m. The core of the walls is made of mud and the sides up to a width of 1.25 m of stones. On all the corners there are rectangular or square bastions. The enclosure covers an area of around 600 sq. m and is filled from bottom to top with burnt cow dung and cow dung cakes. No entrance to the enclosure has been located and its function remains enigmatic. It must have required considerable manpower for quarrying and transport of stones and actual construction of the enclosure. This will be possible only by an accepted authority like a community chief who could mobilize the required labour.

The fortified enclosure was built on top of nearly 2 m thick Chalcolithic habitation deposit. The pre-fortification deposit (Phase A) represents an earlier phase of occupation whereas the deposit above and outside the fortification represents a later phase. The earlier phase is characterized by white painted black-and-red ware, thick red slipped ware, and grey ware, the latter two decorated with incised designs. In Phase B new and finer ceramics like thin red ware and tan ware made of very fine clay and baked at a high temperature and having distinctive shapes were introduced. The tan ware has close affinity with Harappan pottery in fabric and shapes. This ware and the construction of the enclosure were probably inspired by the contact of the Balathal people with the Harappan people of Gujarat.

The subsistence economy of the Balathal people consisted of cultivation of wheat, barley, green gram, black gram, common pea, jujube and millets and domestication of cattle, buffalo, sheep, goat and pig. The wild animals exploited by the people included nilgai, blackbuck, four-horned antelope, chital, sambar, wild boar, hare, mongoose, several species of birds, fish and turtle. The technology mainly consisted of copper tools though occasionally stone blades and microliths were also used.

Of the thirty (calibrated) radiocarbon dates from the Chalcolithic deposit, 25 are stratigraphically consistent and range from 3700-3620 BC to 2200-1800 BC, making Balathal contemporary with Early and Mature Harappan cultures and the oldest known village in India.

The site was abandoned between 1800 and 1500 BC and reoccupied by iron using people around 4th century BC and remained in occupation until *c*. 3rd century AD The Early Historic occupation is characterized by evidence of iron working and a rich and varied assemblage of iron tools and weapons. The architecture consisted of small wattle and daub houses with terracotta drains and ring wells. Several terracotta seals with Brahmi script have been found in this period.

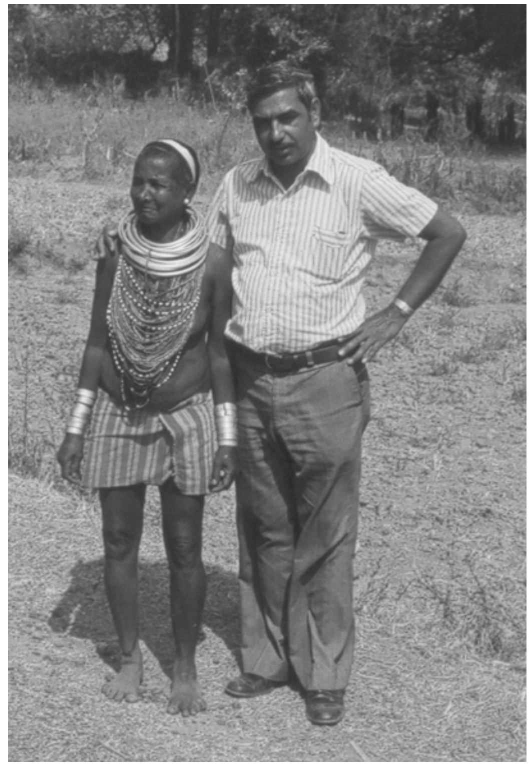


Chalcolithic architecture of Balathal 1996

Five students, namely Anup Mishra, Kurush Dalal, Abhijit Dandekar, and Debashree Dasgupta of the Deccan College and Nicole Boivin of Cambridge have prepared their Ph.D. theses on the material from Balathal.

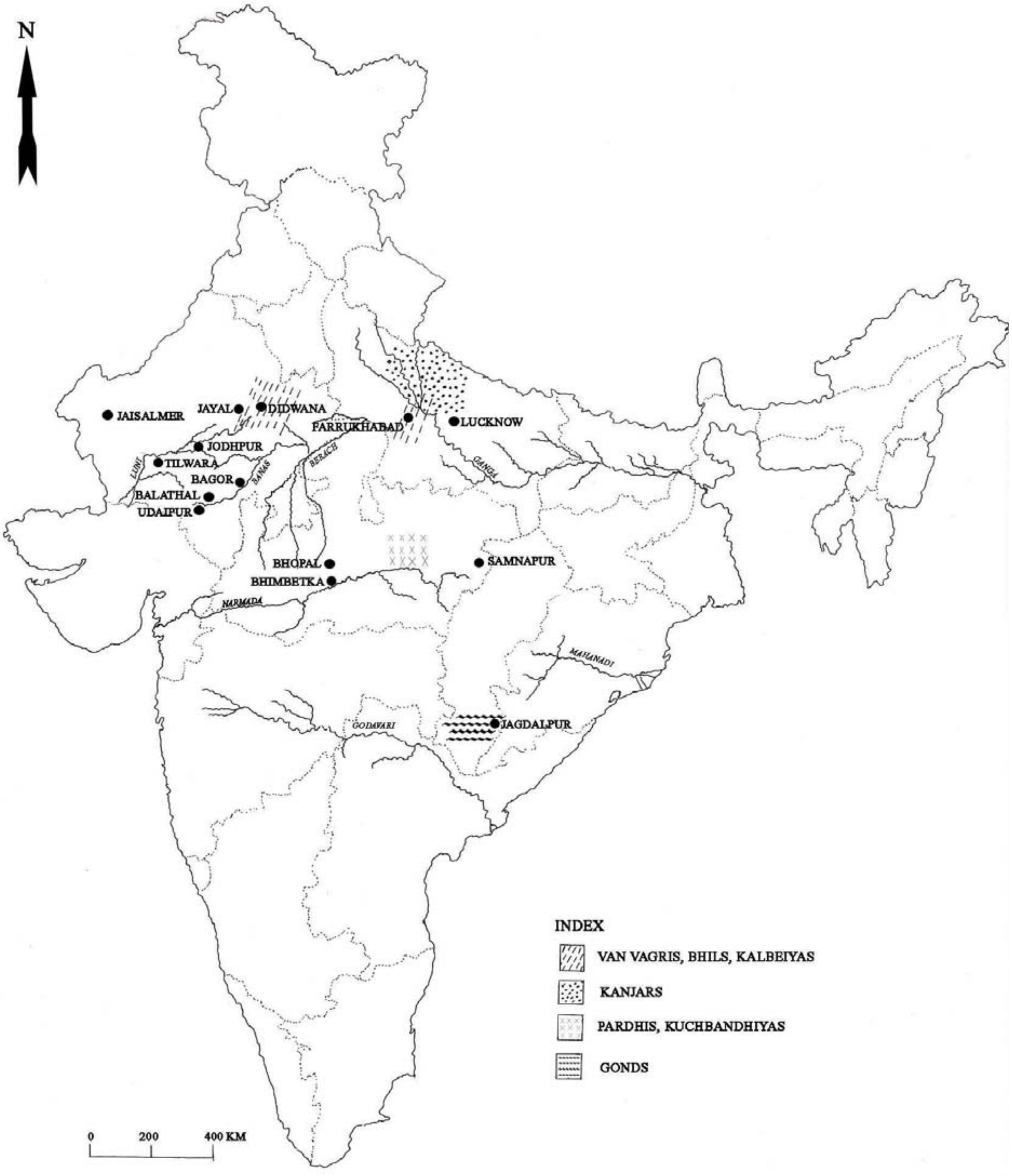
XIX. Ethnographic Research

Because of his rural background VNM had a feeling of respect and sympathy for the rural and tribal people from the beginning. His experience of field work among the tribal people as M.A. student, after completing his M.A. examination, and as a Lecturer in Anthropology at Lucknow University, and example of his teacher, D.N. Majumdar, had increased his interest in tribal ethnography. As he became more and more aware of the importance of ethnographic analogy in the interpretation of archaeological data, his interest in ethnography deepened. During his explorations and excavations he would always collect information about rural and tribal societies from workers in the excavation and other people whom he met in various contexts. If while travelling by road he would see a group camping by the roadside, he would instantly recognize them to be some kind of nomads, and will stop and spend some time with them to enquire about their identity, occupation, social organization, etc. He has a special interest in hunting-gathering people, and would always make enquiries about the existence of such people in the area during his exploration and excavation work. Village men and women employed in excavations were a major source of ethnographic information, and would enthusiastically answer questions asked to them. By such enquiries in the Didwana area he came to know about the hunting-gathering community of the Van Vagris about whom nothing was known from traditional sources like gazetteers and census reports. These people were very shy and scared of strangers, particularly after the government's forced vasectomy programme during the 1970s. However, with perseverance and through the help of local persons whom the Van Vagris trusted, VNM was able to establish excellent rapport with several informants, and collect extremely interesting data on hunting techniques and technology, game hunted, social organization, and religion. VNM also carried out detailed studies of three other hunting-gathering communities, namely Pardhis and Kuchbandhiyas in M.P., jointly with Malti Nagar, and Kanjars in U.P. He also studied the practices of disposal of the dead and raising of memorial structures (wood, stone and cement concrete pillars and cement concrete tombs) among the Muria Gonds of Bastar in M.P. (now Chhattisgarh), and carried out ethnographic studies among the Bhils, Banjaras, and Kalbeliyas in Rajasthan.



V.N. Misra with a Bondo woman at Khairput, Orissa 1979

VNM says that the ethnographic studies of all simple (non-industrialized) societies, and particularly of those practising a hunting-gathering economy, have great relevance for archaeology. Knowledge of their technology, hunting and plant food gathering techniques, social organization, religion, and interaction with other communities provides us very valuable clues for interpretation of archaeological data and understanding the behaviour of past societies. One of the many examples of the application of ethnographic analogy to archaeology can be cited from western Rajasthan. In this region microlithic sites are very common, occurring mainly on sand dunes and occasionally on rocky surfaces. They cover areas of varying sizes, from about 30-40 sq. m to several hundred sq. m, and the number of artefacts varies from a few scores to several thousand. Obviously, many of these sites represent ephemeral occupations by small groups. A sight which is very common in the region today is of small groups of people belonging to nomadic communities like the Van Vagris, Kalbeliyas, Bhils, Jogis, and Banjaras,



The area where V.N. Misra has carried out fieldworks

moving in the countryside or camping on sand dunes in small groups. They stay in one place for a few days or weeks for work on temporary projects, hunting, providing entertainment to local people, watching crops of farmers, etc. They build very flimsy huts, and leave some traces of their occupation in the form of hearths, discarded objects, etc. These examples suggest that the microlithic sites probably represent short stays of nomadic Mesolithic hunter-gatherer groups.

XX. Participation in conferences, seminars, etc. and visits abroad

VNM has participated and presented papers in over fifty national and international conferences, seminars, symposia, workshops, etc. Of the international conferences, etc. the major ones are listed in Appendix F.



V.N. Misra with J. D. Clark and Tim White (to left) and Mrs. Clark (to right), IUPPS Conference at Forli, Italy 1996

In addition to these conference-related visits, VNM visited several other countries for other purposes. In 1979 he went to Greece under the Indo-Greek cultural exchange programme, saw many famous archaeological sites and museums on the mainland as well as in Crete, and gave lectures on Indian archaeology in the Archaeology Department of the University of Athens. On this occasion he also visited Egypt and saw the pyramids at Giza and the Cairo museum. In 1982 he went to Ethiopia as a member of the international expedition led by J.D. Clark for search of Early Man. In 1986 and 1994 he visited Bangladesh on behalf of the Ford Foundation, first time to prepare a feasibility report for establishing a Department of Archaeology at Jahangirnagar University, Savar, Dhaka, and second time to review the progress of the Department which was established in 1987. The newly established department sent four of its lecturers, M.M. Hoque, S.S.M. Rahman, S. Ahsan, and A.B. Paul to do their Ph.D. at the Deccan College. The first two worked under the supervision of VNM, and the other two under the supervision of S.N. Rajaguru and V.S. Shinde.

XXI. Organization of Conferences

VNM has been associated with the organization of a number of conferences. The important ones of them are the following.

(i) Indian Prehistory 1964

In 1964 H. D. Sankalia organized the first national seminar on prehistory and protohistory of India, and nominated VNM as secretary to look after the organizational work. The seminar had a pattern quite different from normal seminars/conferences. Forty archaeologists actively engaged in field and/or laboratory research were invited for participation. Papers on 10 topics on which maximum research was being done or which were considered particularly important for research, were invited from experts in those fields. Each of these papers was sent to a select group of scholars for submitting written comments in advance. Sixteen young research scholars from different institutions were invited to enable them to interact with senior scholars. The papers were discussed in maximum possible detail over a period of eight days (from 24th to 31st May). Every participant was given an opportunity to comment on the papers. In the end all the comments were submitted to the authors of the papers, who were asked to submit written reply to the comments. The proceedings were edited by VNM and M.S. Mate and were published by the Deccan College in 1965 under the title, *Indian Prehistory: 1964.* The book continued to be in demand even after three decades and was reprinted in 1995.

(ii) Symposium on Indo-Pacific Prehistory 1978

In 1977, as a member the national organizing committee of the Xth International Congress of Anthropological and Ethnological Sciences (ICAES), which was to be held at New Delhi in the second week of December 1978, VNM had offered to organize a post-Congress symposium on Indo-Pacific prehistory as the first conference of the Indo-Pacific Prehistory Association (IPPA) at the Deccan College, Pune. The symposium was held on 19-21 December 1978. One hundred and twenty-two scholars from 13 countries participated in it, the maximum participants being from India, Australia, USA, U.K. France and Canada. Seventy-five papers, divided into four sections and covering the entire range of Indo-Pacific prehistory, were presented at the symposium. The abstracts of all the papers, and in some cases full papers, were either mailed to the participants in advance or given by hand at the ICAES in New Delhi. Every evening the participants were entertained by programmes of Indian classical music and dance by well-known artists. The proceedings of the symposium, edited by VNM and Peter Bellwood,

the latter secretary of IPPA, were published under the title of *Recent Advances in Indo-Pacific Prehistory* by Oxford-IBH, New Delhi in 1985.

VNM recalls an unforgettable experience associated with the symposium. He had offered to organize a visit for the participants to Bhimbetka and Narmada valley sites at Hoshangabad on the way from New Delhi, after the ICAES ended on 16 December, to Poona. A large number of participants, mainly from overseas countries had welcomed the visit and sent money to cover the travel expenses from New Delhi to Pune by train. VNM had entrusted the travel arrangements to a reputed travel agency in Pune, which had, in turn, assigned the job to its Delhi branch. However, when VNM reached Delhi on 8 December, he learnt to his horror that the agency had made no arrangements. He was in a panic as his reputation and credibility were at stake, and unless the travel arrangements were made quickly, the participants will not be able to reach Pune in time, where all arrangements for the symposium had been made. He met senior railway officers with a request to attach a special coach to GT Express, the only train whose schedule could carry the delegates to Bhopal, detach the coach there for 24 hours, and then attach it to another train which would carry the delegates to Bombay on way to Pune. The officers, however, told VNM that the GT Express already had its full load of coaches and its engine could not carry an extra coach. They offered to attach the coach to another train which was of no use. In desperation, at the last moment, VNM decided to seek the help of the railway minister, Madhu Dandawate, and went to his residence and met his personal secretary (PS). To VNM’s great relief the PS said that he will arrange a coach to be attached to the GT Express. The only problem was that no First Class coach was available and hence a second class coach, which has only hard wooden berths, will be attached. VNM had no choice but to gratefully accept what was offered. The travel agency now made amends for their earlier lapse. It sent two of its employees, with mattresses and clean linen and all arrangements for tea/coffee and food up to Bombay. The delegates arrived at Bhopal on 17 December morning. Here VNM’s friends, B.M. Pande, Superintending Archaeologist of the ASI, and M.D. Khare, Director of M.P. State Archaeology Department, at Bhopal, had arranged for the delegates to be treated as State Guests, and all hospitality, including a dinner at Itarasi by the Collector of Hoshangabad, were provided to them. The participants could see the excavated trenches and rock paintings at Bhimbetka on 17 December and the Narmada Quaternary sections at Hoshangabad the next day. They left Itarasi in the afternoon of 18 December and arrived at Pune early in the morning of 19 December, just in time for the inauguration.



Xth ICAES: Post-Plenary Symposium on Indo-Pacific Prehistory. Deccan College 1978

Standing Ist row (left to right): P.R. Kulkarni, D.K. Bhattacharya, M.D. Kajale, C. Higham, I. Glover, K. Paddayya, B. Murty, S.W. Chitale, S.N. Rajaguru, S. Chakrabarti, J. Jacobson, P.C. Pant, C.P. Groves, P. Bellwood, I.M. Crawford, K. Gollan, V. Prakash, D. Miller, W. Meecham, D.W. Orchiston, S.C. Malik, S.J. Hallam; **IInd row**: K. Kaul, A.K. Ghosh, S.P. Gupta, M. Bhattacharya, T.C. Sharma, K.L. Mehra, C.E. Dortch, V.VM. Rao, D. Raju, R. Settar, B.P. Bopardikar, P. Singh, P. Rajendran, G. Kumar, Y.H. Sinoto, R. Ohtsuka, K.R. Barz, W. Ayres, S.G. Supekar, Mrs. Aures; **IIIrd row**: Z. Cooper, S. Pandya, N. Boga, V. Jayaswal, S. Wadia, R. Ray, V.S. Wakankar, G. Presland, Mrs. Whyte, R.O. Whyte, G.L. Badam, M. Mafaat, A. Kumar, R.V. Joshi, B. Bronson, R.P. Soejono, KA.R. Kennedy, A.V.N. Sarma, S. Sundara, S.N. Rao, R.S. Pappu, V. Chapman

Sitting Ist row: B. Allchin, I. McBryde, D.J. Mulvaney, G.R. Sharma, W.G. Solheim II, M.A. de Lumley, H.de Lumley, S.B. Deo, J.D. Clark, H.D. Sankalia, V.N. Misra, K.R. Alur, J. Golson, P.E.L. Smith, F. Ikawa-Smith, P. Groves; **IInd row**: L. Modokoro, I. Lim, V. Misra, Y. Mathpal, J.S. Chingunde, D.R. Raju, M. Nagar, M. Lal, R.P. Pandey, Z. Husain, N. Chander, S.C. Nanda, C. Grigson, J. Kamminga, S.K. Ray, V. Budholia, D. Smith.

(iii) World Archaeological Congress - 3 (WAC-3) 1994

The organization of World Archaeological Congress (WAC) was born in 1986 out of a stormy split in the International Union of Prehistoric and Protohistoric Sciences (IUPPS) on the question of participation of archaeologists from South Africa and Israel in the congress at Southampton. After

Peter Ucko, who was to organize the congress, expressed his inability, under pressure from Labour Party dominated organizations, to accept the participation of South African and Israeli archaeologists, IUPPS disowned the congress. But by then Ucko had gone so far with preparations for the conference that it was not possible for him to abandon it. He therefore went ahead with organizing it under the hurriedly founded World Archaeological Congress. On Ucko's request Indian Archaeological Society (IAS) and Indian Society for Prehistoric and Quaternary Studies (ISPQS) became, among other organizations, sponsors of the WAC-1. Makkhan Lal, a young Indian archaeologist, who was in England at that time, assisted in organizing WAC-1, and over 50 Indian archaeologists participated in it. After his return to India Lal took initiative in establishing an Indian chapter of WAC, and lobbied with senior archaeologists for organizing the third conference in India. With the initiative taken by B.B. Lal, S.P. Gupta, D.P. Agrawal, VNM and a few others, the ASI agreed to be the host and sent a formal invitation to Jack Golson, President of parent WAC, in 1991 for holding WAC-3 in India, and this was accepted by the parent body. An organizing committee was set up with B.B. Lal as President, M.N. Deshpande and B.K. Thapar as Vice-Presidents, M.C. Joshi, Director General, ASI as Secretary General, Makkhan Lal as Treasurer, and several others, including VNM, as members. Meanwhile, M.C. Joshi retired on 31st March, 1993 as DG, ASI, and therefore ceased to be Secretary General. He was succeeded by a bureaucrat who was unfortunately not very cooperative with the committee. The President and Vice-Presidents then asked VNM to accept the responsibility of Secretary General. VNM pointed out to them that because of his administrative job as Director of the Deccan College, and also being based in Pune, it will not be possible for him to do justice to the responsibility of the position of Secretary General, more so because WAC-3 was to be held in Delhi. However, because of the insistence of these senior archaeologists he reluctantly accepted the responsibility.

As Secretary General VNM was ex-officio convener of all the committees. He had to prepare the agenda and minutes of the meetings of all the committees and send them to the members. As all the meetings were held in Delhi, for almost an year he had to travel frequently to Delhi, sometimes twice a week. He spent nearly a year on the preparations and organizing of the conference.

Unfortunately, the conference got beset with politics from the very beginning. A small group of historians and archaeologists were obsessed that the issue of the demolition of the Babri Masjid (which happened in December 1992) should be a major subject of discussion during the Congress. The organizers wanted to avoid it because it was an emotionally charged issue and had been given a communal colour. It had led to communal riots and loss of many lives and property. Discussion of this issue would push the legitimate and serious academic subjects of the Congress into the background and vitiate the academic atmosphere. Some people created a lot of disturbance during the registration of delegates on the very first day and again during the plenary session. A section of the English press depicted the organizing committee as composed of Hindu fundamentalists, which was totally untrue. Because of the adverse propaganda in the English press the President of India who had earlier agreed to inaugurate the Congress declined to do so at the last moment.

There were other problems as well. The organizers had no proper office in Delhi. The makeshift office in Purana Qila did not even have a telephone, and secretary general had to share the phone with the ASI office in the same premises. Many participants, specially from overseas, were put to great inconvenience in contacting the Congress office. Also, a number of foreign participants came without a visa and were stranded at the airport. VNM spent a lot of time in contacting the authorities in the Home Ministry to obtain government clearance for these delegates to participate in the Congress. Altogether, the conference turned out to be a chaotic affair and brought a bad name to the organizers and the country.

(iv) Introduction of African Cultivars into South Asia

Certain millets like bajra (*Pennisetum typhoides*), jowar (*Sorghum bicolor*), and ragi (*Eleusine coracana*) play a very important role in the food economy of semi-arid and even sub-humid regions of South Asia. These millets are believed to be of African origin. However, the exact time and process of their introduction into South have not been correctly identified. Maurizio Tosi, an eminent archaeologist and the director of the

Italian Embassy Cultural Centre, New Delhi in the late 1980s and early 1990s, and K.L. Mehra, a former scientist of the International Bureau of Plant Genetic Resources (IBPGR), New Delhi, discussed this subject with VNM on several occasions during 1989-90 and suggested to him to organize a workshop for a thorough discussion of the issue. Accordingly, VNM organized an international workshop on 7-8 December 1991 at the Deccan College on `Prehistoric Contacts between South Asia and Africa: The Dispersal of Plant Cultivars along the North Indian Seaboard'. The participants included, besides Tosi, Mehra and VNM, M.D. Kajale from Deccan College, K.S. Saraswat from Birbal Sahni Institute of Palaeobotany, Lucknow, R.K. Arora from IBPGR, New Delhi, Lorenzo Costantini from IsMEO, Rome, Sandor Bokonyi from Budapest, Philippe Gouin from CNRS, Paris, and faculty members and research scholars of the Archaeology Department of Deccan College. The proceedings of the workshop, which also include the specially invited papers by M.R. Mughal from Lahore, Pakistan and Seetha N. Reddy from Wisonsin, USA, edited by VNM and M.D. Kajale, have been published by the Indian Society for Prehistoric and Quaternary Studies in 2003, Pune, under the title, *Introduction of African Crops into South Asia.*

(v) Joint Conference of three societies

The Indian Archaeological Society (IAS), The Indian Society for Prehistoric and Quaternary Studies (ISPQS), Pune, and the Indian History and Culture Society (IHCS), New Delhi, have been holding their annual conference jointly right from the time of their inceptions. In 1999 VNM organized the joint conference of the societies at the Deccan College to coincide with the Diamond Jubilee of the college as a Research Institute. It was one of the most largely attended conferences. On this occasion senior archaeologists S.P. Gupta, J.P. Joshi and V.D. Misra, and past students of the old (pre 1934) Deccan College, N.B. Godbole, M.V. Deshpande, N.V. Bapat and K.G. Bhadbhade were felicitated. Dr. Statira Wadia was felicitated for her very important contribution to the editing of *Man and Environment*. S.P. Gupta delivered the H.D. Sankalia Memorial lecture and K.N. Dikshit delivered the Presidential address of ISPQS. A large number of papers were presented during the conference.



V.N. Misra welcoming the delegates of the Societies 1999



V.N. Misra with S.P. Gupta during Conference at Deccan College 1999

XXII. VNM and the Deccan College

From 1962 to 1981 VNM was on the staff of the Poona University Department of Archaeology, first as lecturer (1962-68) and then as Reader and Head of the Department (1968-81). In 1981 he joined the Deccan College as professor of prehistoric archaeology. He became Joint Director in 1986 and Director in 1990. He retired from the latter post on 31 August 2000.

Some of the salient developments and events during the period of his directorship are given below.

(i) Deemed University Status

In 1983 the then Director of the Institute, S.B. Deo applied to the UGC for granting the Deemed University status to the Institute. The UGC sent an expert committee in 1985 for inspection of the Institute, and the committee recommended the granting of the deemed university status, subject to the formation of a registered society and memorandum of association for running the Institute. This recommendation posed a serious problem because the Institute is run by the government of Maharashtra under the Bombay High Court Decree of 1938, and formation of new society was legally not feasible. By this time Deo had retired and M. K. Dhavalikar succeeded him as

Director. Dhavalikar brought the problem to the notice of the UGC but it took a lot of explaining and correspondence to convince the UGC not to insist on the formation of a regd. society. Finally, the Ministry of HRD, Govt. of India, on the recommendation of the UGC, granted the status in March 1990, and asked the Institute to frame new Rules and Byelaws for the functioning of the University. On Dhavalikar's request, the Chairman of the Institute's Council of Management, Prof. S.C. Gupte, appointed a four-member committee to frame the draft rules and byelaws. Dhavalikar retired as Director in May 1990 and was succeeded by VNM. After a number of sittings the committee prepared the drafts. These were then placed before the Council of Management, which examined them thoroughly over several sittings lasting nearly six months. The Rules were then submitted to the UGC and the State Govt. and the Byelaws only to the State Govt. for their approval. Obtaining this approval proved to be a very tough task because the UGC wanted the Institute to have complete autonomy and the State Govt. wanted to have total control. It required a lot of correspondence and many visits by VNM to Delhi and Mumbai to persuade the senior officers of the two organizations to dilute their stands so that a meeting ground could be found. Finally, the rules were approved in July 1994 and the Institute started functioning as a Deemed University. On Dhavalikar's request the State Govt. had agreed to create several new teaching and non-teaching posts, appointments to which were made after the Institute started functioning in its new capacity.

(ii) **The Ford Foundation**

One of the many memorable experiences of VNM at the Deccan College was his contact with the Ford Foundation. In 1981 V.C. Joshi, then Project Officer with the Foundation at New Delhi, and one of the finest persons VNM has met, expressed a desire to meet the latter. Their meeting later in Joshi's office led to VNM joining the expedition led by distinguished archaeologist J.D. Clark for search of early man in Ethiopia in 1982. Subsequently, VNM invited Joshi to visit the Deccan College, meet his colleagues and see the research work being done in archaeology. Joshi visited the Institute in early 1983 and was highly impressed by the research output and potential of the department. His visit led in 1983 to the Foundation giving a grant of nearly 300,000 US $ to the department for augmentation of research facilities. Later, the Foundation gave four more grants, the last in 1992, the total amount exceeding 800,000 US $. Mary Zurbuchen, one of Joshi's successors, was also very supportive. These grants were utilized for acquisition of sophisticated research equipment like X-Ray Diffractometer, Atomic Absorption Spectophotometer, a number of microscopes, several vehicles for field work, books and journals for the library, for doing field work, for publication, for establishing a computing centre for staff and students, and for sending faculty members for advanced training in overseas institutions and for participation in international conferences. The grants have made a substantial contribution to upgrading research facilities and to the quantity and quality of the research output of the department.



V.N. Misra with C. Subramaniam, Governor of Maharashtra and S.C. Gupte, Vice-Chancellor, Pune University in Lokmanya Bal Gangadhar Tilak's room at Deccan College 1991



V.N. Misra with P.C. Alexander, Governor of Maharashtra and Mrs. Alexander at Deccan College 1994

(iii) University Grants Commission (UGC)

The UGC regulates the standards of higher education and provides funding for universities and colleges. Institutions and departments performing better are given special and higher grants. In 1972 the UGC had recognized the archaeology department of the Institute for Special Assistance Programme (SAP) and in 1985 this status was

upgraded to Centre of Advanced Study (CAS). During the period of VNM's directorship, the work of the CAS was evaluated by expert committees in 1992 and 1998. The committees gave superlative reports, and on the basis of the reports the UGC sanctioned substantial grants to the department for acquisition of laboratory equipment, books and journals, two vehicles for field work, and for field work, publication, and hiring of secretarial staff. It also sanctioned two new posts of lecturer in bioarchaeology and computer archaeology. During the IXth Five Year Plan the UGC provided substantial funds to the Institute for the acquisition of laboratory equipment, books and journals, for extension of archaeology and library buildings, renovation of old buildings, computerization and networking of the library, and purchase of a car.

(iv) Deccan College Emergency Relief Fund

Like all public institutions in India, Deccan College too has a large strength of peons, watchmen, and other categories of employees whose salaries are low. Most of them are hardly able to make any savings, and in situations of illness or other unexpected problems, they are forced to borrow money from their provident fund and staff welfare association fund, both of which they have to refund in installments. Besides, often they have to borrow money from banks and moneylenders at high rates of interest, and also from their better paid colleagues in the College. VNM, who was also often approached for loans and gave them, was continually thinking of finding some way to help these people. Finally he thought of establishing an emergency relief fund through contributions from the employees. From this fund needy employees will be given a non-refundable grant in case of emergencies like serious illness and death. He appealed to the employees and the response was good. Over the years help has been given from the fund to a number of persons.

(iv) Afforestation of the campus

Deccan College has a large campus of 125 acres. Being a specialized research Institute with small student and staff strengths it is unable to utilize all the land. During World War II the campus was taken over by the Indian Army for establishing an officers training school and was in Army's possession for about ten years. During this period the army built a large number of barracks for its staff. These barracks became the property of the Institute after the army vacated the campus in 1949, and were used for housing its staff. But as the barracks were meant to be temporary structures, they slowly started decaying and had to be pulled down as they became unsafe for living. As a consequence most of the campus was slowly reduced to empty and barren rocky land. VNM successfully persuaded the State Forest Department to plant trees over the entire vacant land. This has made the campus green and beautiful, and has reduced pollution from the growing number of vehicles which use the road passing through the campus. The trees also provide fuel wood (through illegal felling) to poor inmates of the campus as well as to residents of colonies immediately outside the campus.

XXIII. Indian Society for Prehistoric and Quaternary Studies (ISPQS) and *Man and Environment* (ME)

The Indian Archaeological Society (IAS) was founded at Varanasi in 1966 at the initiative of Prof. A.K. Narain, and it immediately started holding its conference and publishing its journal, *Puratattva*, every year. However, after a few years it became clear that the IAS and *Puratattva*, with their thrust on protohistory and early historic archaeology, were unable to do justice to prehistory which was a fast growing branch of Indian archaeology. Therefore, in 1975 S.P. Gupta, D.P. Agrawal (DP), VNM, S.C. Malik and a few other colleagues established the Indian Society for Prehistoric and Quaternary Studies (ISPQS) to promote research in prehistory, Quaternary studies, human evolution, and ethnoarchaeology. Initially, the Society's office was located at PRL, Ahmedabad, and DP was general secretary. The office was shifted to Deccan College, Pune after VNM became general secretary in 1981. The Society started holding its annual conference jointly with IAS from 1976, and bringing out its own journal, *Man and Environment*, in 1977 with VNM as editor. During 1982-84 (Vols. V-VII) and 1985-88 (Vols. VIII-XII) DP and D.K. Chakrabarti were editor, respectively. From 1989 VNM has been editor. He was also general secretary of the Society from 1981 to 2000, but for a gap of three years when S.N. Rajaguru held this post. From 2001 he has been chairman of the Society.

Developing the Society and its journal have been a mission for VNM, and he has devoted a lot of time and energy for this purpose. After he took over as general secretary, life membership of the Society grew fast, and now stands around 500. In 1989 he obtained a grant of 45,000 US $ from the Ford

Foundation for making the journal biannual and improving its editorial and printing quality. *Man and Environment* is the only refereed archaeology journal in South Asia and receives contributions from leading archaeologists in India and outside. In running the Society and the Journal, VNM is assisted by competent small teams.



V.N. Misra with V.S. Pathak and other delegates at the Societies conference at Gorakhpur 1995

VNM was instrumental in establishing the H.D. Sankalia Memorial Lecture and the H.D. Sankalia Young Archaeologist Award through the Society. Other awards given by the Society, with the establishing of which he was associated, are Malti Nagar Award for Ethnoarchaeology, and R.K. Sharma Award for Excellence in Archaeology. The last two awards have been established from the donations given by the scholars after whom they are named. The Sankalia Memorial lecture is published in ME in the issue immediately following the lecture. The H.D. Sankalia Young Archaeologist Award and Malti Nagar Award for Ethnoarchaeology are given for research papers presented at the Society's conference and adjudged best by independent panels of judges. The Sankalia Award is restricted to scholars below 35 years of age, and the Nagar Award can also be given for published work.



V.N. Misra being felicitated at the Societies conference at Tirupati 2003

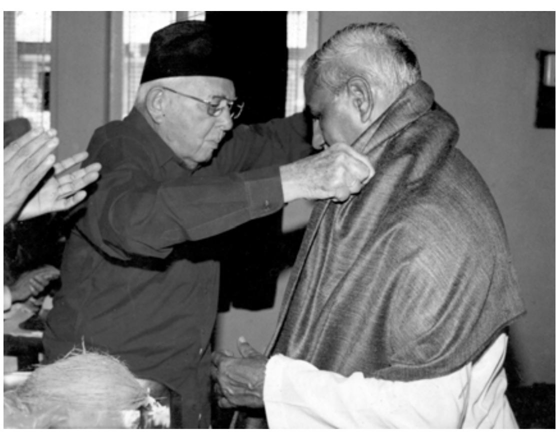
XXIV. VNM as Anthropologist

VNM came to archaeology from anthropology, and throughout his archaeological research he has retained his interest in anthropology, particularly in the lifeways of the rural and tribal people, and in the formation of Indian society. He firmly believes that the existing Indian society has evolved not only from its historical antecedents but also from prehistoric and protohistoric ones. In his view much of the enormous biological, economic, technological, material culture, social, linguistic, and religious diversity seen in the country can be satisfactorily explained only with the help of archaeological data. He also believes that archaeology can be meaningful only if it is used to understand the present society. For this reason, the archaeologist should not only be familiar with archaeological data but also with that of the living society. It is because of this conviction that he spends a considerable time in collecting information about the culture of the people living in the area where he does archaeological field work. One of the most favourite topics of his lectures is `Prehistoric roots of Indian society'.

VNM gives credit for his modest academic achievements to his teachers and to the Deccan College. Among the former he is particularly indebted to four: Pandit Brahmanand Shastri, who encouraged him to go for college education and helped him get admission into D.A.V. College, Kanpur; Prof. K.N. Sharma, who advised him to study anthropology at M.A.; D.N. Majumdar and H.D. Sankalia, both of whom inculcated in him the spirit of hard work and dedication, and Majumdar also for advising him to do research in prehistory, which became his life long work. Sankalia, though physically frail, was extremely energetic, industrious and totally devoted to archaeology. He was also extremely simple, unassuming, disciplined and well organized. By his example, he was a great source of inspiration to VNM. As both of them were living on the campus of the Institute, they were in contact with each other even on holidays.

Deccan College provided VNM the best facilities for research available in any institution of humanities and social sciences in India: a well-equipped and well-managed library, funds for research, qualified technical staff, freedom to choose the subject, geographical area and time of

one's research projects, a conducive research environment with many competent and dedicated colleagues and students, and a place where leading scholars from all over the world were regular visitors and delivered lectures. He considers himself very fortunate that many leading archaeologists, both from India and outside, have visited his home. He is particularly happy that he had S.N. Rajaguru as his colleague in the Rajasthan and Narmada valley projects. Rajaguru is totally devoted to his work, extremely industrious, honest and unassuming. VNM learnt a lot of Quaternary geology from him. He is also happy that he got a number of bright, honest and hard working students for doing doctoral research under his supervision. Most of them got jobs in archaeology. One has retired as a professor, five are working as professors and several others in other positions, including three at the Deccan College. VNM is also happy that he has got a number of loyal and caring friends, notable among whom are Vishwa Mohan and P.K. Tewari at Lucknow, S.P. Gupta at Delhi, D.P. Agrawal at Ahmedabad, late K.T.M. Hegde at Baroda, and S.C. Gupte at Pune. Prof. Gupte as Chairman of the Council of Management of Deccan College and as President of the Deemed University, extended unqualified support to VNM in several crises he had to face as Director of the Institute. VNM is indebted to a large number of members of the archaeological and anthropological communities – elders, contemporaries and juniors - who have given him tremendous affection. Finally, he feels extremely grateful to his wife who has taken care of the home, leaving him free to pursue his research, and cheerfully endured long periods of separation while he was away on field work, fellowships, conferences, and other academic assignments.



Principal N.D. Nagarwala, a former student of the pre-1934 Deccan College, felicitating V.N. Misra 1995

Asked if he has any regrets, and if he was given a chance, would he do things differently, VNM says that his main regret is that he devoted too much time to field work, and accepted membership of too many committees. This left him inadequate time for analysis of data, writing and publication. His advice to younger scholars is: don't take up a second project until you have completely finished the first one, and try to resist the temptation of membership of too many committees.

XXV. VNM as a Human Being

By temperament VNM is simple, unassuming and informal, and least conscious of his academic or administrative status. On his letterhead or visiting card he has never used Dr. or Prof. before his name or academic degrees after it. As head of the department of archaeology and director of the Institute, he was easily accessible to every body who wanted to see him – be it a student, lower class employee or any visitor. He would offer a chair to every person who went to see him, and hated to keep people standing, as is common with administrators in India. He would also offer tea/coffee to every visitor and by giving company to them ended up drinking several cups every day. His home has been as welcome a place as his office, and students and staff members were free to visit him at any hour even on holidays. Even after his retirement quite a few students and colleagues continue to visit him. As Deccan College did not have a guest house, his home served as a guest house for many visitors to the College. He would freely mix with students and employees irrespective of their status, particularly during festivals like Holi and immersion of Ganesh idols.

VNM is always polite and respectful to others, in particular to those less privileged than him, and is very conscious of not hurting the feelings of anybody. He is particularly respectful to women, irrespective of their age or status. He has deep respect for his teachers, elders and for people who have helped him in some way or the other. He feels most happy in the company of simple and innocent people like the workers in his excavations and informants in ethnographic enquiries. VNM also derives happiness by being able to help others, and has helped many needy people by lending them money, students in getting fellowships and grants, and colleagues in getting funding for conferences, etc. In return, he has received plenty of kindness, help and hospitality from numerous students and professional colleagues all over the country and

outside, and he greatly cherishes the consideration shown to him by so many people.

Being born in a village on the bank of a large river, Ramganga, VNM learnt swimming at a very early age, and is very fond of it. In fact, if he sees a river or lake, he can't resist jumping into it. When he was digging at Samnapur in the late 1980s, he had to cross the Narmada twice every day by boat. In the evening while returning to his camp he will invariably swim in the river. He has also been fond of walking. Up to almost the age of sixty years he used to play badminton every day. In his youth he was also fond of playing chess. Unfortunately, from 2004 he is not keeping good health because of the prostate problem, and this has severely restricted his movement. But still he spends at least ten hours every day in reading and writing, and in answering e-mails and letters.


V.N. Misra in his study at home 2001

APPENDICES

A. Scholarships, Fellowships, Prizes, etc.

1. Scholarship, Government Sanskrit College, Banaras, 1954-56
2. Bursary Scholarship, Lucknow University, 1955-57
3. Pandit Jagpal Krishna Gold Medal, Lucknow University, 1957, for standing first in order of merit in M.A. examination in Anthropology
4. UGC Junior Research Fellowship, 1958-61
5. Homi Bhabha Fellowship, 1970-71
6. Leverhulme Visiting Fellowship, Australian National University, Canberra, Australia, 1977
7. Senior Fulbright Fellowship, University of California, Berkeley, USA, 1984
8. Corresponding Member, Istituto Italiano per il Medio ed Estremo Oriente (IsMEO), Rome, Italy, 1994
9. Visiting Fellowship in Archaeology, Allahabad University, 1981 and 1988
10. Visiting Professorship in Anthropology, North Eastern Hill University, Shillong, 1985
11. National Fellowship, Indian Council of Historical Research, New Delhi, 2000-2003
12. D.N. Majumdar Medal for Field Work in Anthropology, Indian Social Science Association, 2002
13. Emeritus Fellowship, University Grants Commission, New Delhi, 2003-2005

B. Special Lectures delivered

VNM has delivered invited lectures in archaeology and anthropology in many Indian and foreign universities. In addition, he has delivered following special occasion lectures.

1. Madhoji Scindia Memorial Lecture, School of Ancient Indian History, Culture & Archaeology, Jiwaji University, Gwalior, November 1978
2. Dr. K.S. Mathur Memorial Lecture, Ethnographic and Folk Culture Society, Lucknow, December 1978
3. Prof. D. Sen. Memorial Lecture, Indian Anthropological Society, Calcutta, July 1987
4. Prof. Rajabali Pandey Memorial Lecture, Department of Ancient Indian History, Culture & Archaeology, Rani Durgawati Vishwavidyalaya, March 1988
5. Mahamahopadhyaya Gourishankar Hirachand Ojha Memorial lectures, Rajasthan Vidyapeeth, Udaipur, October 1989
6. Dr. V. S. Wakankar Memorial Lecture, Rock Art Society of India, Agra, October 1992
7. Foundation Day Memorial Lecture, Wadia Institute of Himalayan Geology, Dehradun, June 1996
8. Prof. M. R. Sahni Memorial Lecture, Palaeontological Society of India, Lucknow, October 1996
9. Zamora Endowment Lecture, Department of Anthropology, Karnataka University, Daharwad, March 1998
10. Golden Jubilee Lecture, Ethnographic and Folk Culture Society, Lucknow, April 1998
11. Sir R. G. Bhandarkar Memorial Lecture, Bhandarkar Oriental Research Institute, Pune, August 1998
12. UGC Extension lectures, Department of Ancient Indian History, Culture & Archaeology, Banaras Hindu University, Varanasi, January 2001
13. UGC Extension lectures, Department of Anthropology, Pt. R.S. Shukla University, Raipur, December 2001

C. List of Ph.D. students

Following students have carried out their Ph.D. research under the supervision of VNM

1. 1968. V. Rami Reddy. Pre and Protohistory of Southwestern Andhra Pradesh.
2. 1972. Ms. Katy N. Frenchman. Prehistoric Pottery Industries along the "Lost" Saraswati River of the Great Indian Desert.
3. 1977. P.K. Thomas. Archaeozoological Aspects of the Prehistoric Cultures of Western India.
4. 1978. Yashodhar Mathpal. Prehistoric Rock Paintings of Bhimbetka Central India.
5. 1982. D.R. Raju. Early Settlement Patterns in Cuddapah District, Andhra Pradesh: A Palaeoanthropological Study.
6. 1982. Makkhan Lal. Early Human Colonization Patterns in the Ganga-Yamuna Doab (with special reference to Kanpur District).
7. 1983. Jacob S. Jayaraj. Early Hunter-gatherers Adaptations in the Tirupati Valley, South India.
8. 1984. S.C. Nanda. Stone Age Cultures of Indravati Basin Koraput District, Orissa.
9. 1984. Zarine Cooper. Prehistoric Habitation Patterns around Chitrakot Falls, Bastar District, Madhya Pradesh.
10. 1988. Vijay Singh. Rock Paintings of Sagar Region, Madhya Pradesh.
11. 1990. Md. Shafiqul Alam. A Morphometric Study of Palaeolithic Industries of Bhimbetka, Central India.
12. 1993. M.M. Hoque. Pre and Protohistoric Settlement Patterns of the Middle and Lower Ganga Valley.
13. 1994. J.S. Kharakwal. Archaeological Exploration in the Kumaon Himalaya.
14. 1998. Bishnupriya Basak. Prehistoric Settlement Patterns of the Tarafeni Valley, Midnapore District, West Bengal.
15. 1998. Sunil Gupta. Roman Egypt to Peninsular India: Archaeological Patterns of Trade 1st Century B.C. to 3rd Century A.D.
16. 1999. Shah Sufi Mostafizur Rahman. Archaeological Investigation in Bogra District, Bangladesh (from Early Historic to Early Medieval Period).
17. 1999. Mala Maiya Malla. A study of the Nepalese Bronzes from Ancient to Mediaeval Periods.
18. 1999. B.S. Harishankar. Prehistory and Early History of South Kerala with Special Reference to Kollam.
19. 2000. Anup Mishra. Chalcolithic Ceramics at Balathal, District Udaipur, Rajasthan.
20. 2001. Balaram Triapthy. Archaeology of Boudh district, Orissa with Special Reference to the Early Historic Settlement Pattern.
21. 2001. Shahida Ansari. Prehistoric Settlement Pattern of South-Central Ganga Valley: An Ethnoarchaeological Perspective.
22. 2001. Kurush Feroze Dalal. 'Early Historical Settlement of Southern Rajasthan (Mewar) with Special Reference to Balathal: An Artefactual Approach'.
23. 2001. Abhijit Dandekar. 'Early Historic Ceramics of Mewar with Special Reference to Balathal, District Udaipur, Rajasthan'.
24. 2003. Tama Panda. Evolution of society and Culture of Orissa, based on a Synthesis of Archaeological, Historical, Llinguistic and Anthropological data.
25. 2005. Kumar Akhilesh. A Re-examination of the Upper Palaeolithic 'Damin Industries', Bansloi River Basin, Jharkhand.



V.N. Misra with the editor of the volume (to his left) and three generations of his students, P.K. Thomas, P.P. Joglekar and David Tetso (to his right).

D. Association with academic societies

VNM has been life member of the following academic societies:

1. Ethnographic and Folk culture society, Lucknow
2. Indian Archaeological Society, New Delhi
3. Indian Anthropological Association, New Delhi
4. Indian Society for Prehistoric & Quaternary Studies, Pune
5. Rock Art Society of India, Agra
6. Societe Prehistorique Francaise, Paris
7. Current Anthropology, Chicago

E. Association with journals

(a) Editor

Man and Environment, Journal of the Indian Society for Prehistoric and Quaternary Studies, Pune (1977-).

(b) Co-Editor

The Eastern Anthropologist, Journal of the Ethnographic and Folk Culture Society, Lucknow (1981-86).

(c) Member, Editorial Advisory Board

1. *Journal of the Sarat Chandra Roy Institute*, Ranchi.
2. *The Anthropologist*, Journal of the Indian Anthropological Association, Delhi.
3. *The Eastern Anthropologist*, Journal of the Ethnographic and Folk Culture Society, Lucknow.
4. *Manav* (Hindi), Journal of the Ethnographic and Folk Culture Society, Lucknow.
5. *L'Anthropologie*, Paris.
6. *Journal of World Prehistory*, New York.
7. *The Holocene*, Cardiff, U.K.
8. *Asian Perspectives*, Hawaii, USA.
9. *Geoarchaeology*, Wiley, USA.

F. Participation in major international conferences, Symposia, etc.

1. Second Conference on Asian Archaeology, Colombo, Sri Lanka, August 1969.
2. Eighth Congress of the Far Eastern Prehistory Association, Canberra, Australia, January 1971.
3. Symposium on Radiocarbon and Indian archaeology, TIFR, Mumbai, March 1972.
4. Ninth Congress of the Anthropological and Ethnological Sciences, Chicago, August-September 1973.
5. Ninth Congress of the International Union of Prehistoric and Protohistoric Sciences, Nice, France, September 1977.
6. The Australian Museum, Sydney, 150th Anniversary symposium, Sydney, Australia, August 1977.
7. Forty-eighth Congress of the Australia and New Zealand Association for the Advancement of Science, Melbourne, Australia, September 1977.
8. Symposium on Conservation of Rock Art, Perth, Australia, September 1977.
9. Tenth Congress of the Anthropological and Ethnological Sciences, New Delhi, December 1978.
10. First Congress of the Indo-Pacific Prehistory Association, Pune, December 1978.
11. First Congress of Human Palaeontology, Nice, France, October 1982.
12. Indo-Soviet Joint Seminar on Copper-Bronze Age Cultures of India and Central Asia, Allahabad University, February 1982.
13. Eleventh Congress of the Anthropological and Ethnological Sciences, Quebec and Vancouver, Canada, 1983.
14. Indo-U.S. Symposium on Problems of the Arid Zone, CAZRI, Jodhpur, January 1985.
15. Twelfth Congress of the Indo-Pacific Prehistory Association, Penablanca, The Philippines, January-February 1985.
16. Eighth Congress of the European Association of South Asian Archaeologists, Aarhus, Denmark, July 1985.
17. Symposium on Palaeoclimate, Physical Research Laboratory (PRL), Ahmedabad, December 1986.
18. The Longest Record: Human Career in Africa. Conference in Honour of J.D. Clark, University of California, Berkeley, April 1986.
19. Conference on Old Problems and New Perspectives on the Archaeology of South Asia, University of Wisconsin-Madison, USA, November 1986.
20. Thirteenth Congress of the Indo-Pacific Prehistory Association, Japanese Society for Oceanic Studies, and National Museum of Ethnology, Osaka and Tokyo, September 1987.
21. Seminar on New Archaeology and India, Indian Council of Historical Research, New Delhi, October 1988.
22. Seminar on Environmental Change and Human Response: The First Two Million Years, Deccan College, Pune, December 1990
23. Seminar on Towards the Second Century of Archaeology in Sri Lanka, Colombo, July 1990.
24. Fourteenth Congress of the Indo-Pacific Prehistory Association, Yogyakarta, Indonesia, August-September 1990.
25. Symposium on the Ethnoarchaeology of South Asia, Cambridge, U.K., September 1991.
26. Symposium on the 50th Anniversary of the Lubbock Lake Landmark, Lubbock, Texas, USA, October 1992.

27. Twelfth Conference of the Association of South Asian Archaeologists, University of Helsinki, Finland, July 1993.
28. World Archaeological Congress – 3, New Delhi, December 1994.
29. Second Congress of the K.R. Kama Institute, Bombay, January 1995.
30. Thirteenth Congress of the European Association of South Asian Archaeologists, Cambridge, U.K., July 1995.
31. Thirteenth Congress of the International Union of Prehistoric and Protohistoric Sciences, Forli, Italy, September 1996.
32. Dual Congress of the International Union for the Study of Palaeontology and International Union of Human Biologists, Sun City, South Africa, June-July 1998.
33. Fifteenth Congress of the European Association of South Asian Archaeologists, Leiden, The Netherlands, July 1999.
34. Seventeenth Congress of the Indo-Pacific Prehistory Association, Taipei, Taiwan, September 2002.

G. Some other positions of responsibility held

1. Member of the committee which did the initial planning of the National Museum of Man (now Indira Gandhi Rashtriya Manav Sangrahalaya), Bhopal, in 1976, and later of its *Samiti* and executive committee. VNM was associated with the Museum in one capacity or other for about 25 years.
2. Member, UGC Panel on Anthropology (1980-83, 1985-88).
3. Member, UGC Panel on History and Archaeology (1990-92).
4. Member, Executive Committee (1976-80), Vice-President (1981-84) and President (1985-88), Indo-Pacific Prehistory Association.
5. Member, Advisory Committee, Anthropological Survey of India (1976-80).
6. President, Anthropology and Archaeology section, Indian Science Congress, Bangalore, 1987.
7. Member, Indian Council of Historical Research (1991-97).
8. Member, Standing Committee, Association of Indian Universities, (1997-99).
9. Member, Central Advisory Board of Archaeology (1998-2002).
10. Member, Scientific Advisory Committee, Dept. of Culture, Govt. of India (1999-2002).
11. Member, Central Sanskrit Board (1999-2002).
12. Member, Academic Council, Pune University, M.S. University of Baroda, Banaras Hindu University, and University of Trivandrum.
13. Member, Board of Management (1998-2002), and Vice-President (2004-), Indian Archaeological Society.
14. Member, UGC Review Committee, Special Assistance Programme, Department of History, M.S. University of Baroda (1996-91), Dept. of AIHC & Archaeology, Banaras Hindu University, Allahabad University, and HNB University, Srinagar (Garhwal) (2002-04).
15. Member, UGC Advisory Committee, Special Assistance Programme, Dept. of AIHC & Archaeology, HNB University, Srinagar (Garhwal) (2002-04), M.S. University of Baroda (2002-04), Department of History, Sambalpur University (1999-2002).
16. Member, Board of Management, National Museum Institute (Deemed University), New Delhi (2002-04).
17. Member, Indian Institute of Advanced Study Society, Simla (2002-04).
18. Convener, UGC X Plan Visiting Committee, Vidyasagar University, Midnapore and Maharshi Dayanand Saraswati University, Ajmer.



Annotated Bibliography of Prof. V.N. Misra's Research Publications (1962-2005)

P.P. Joglekar

Background

Professor V.N. Misra began his academic career nearly half a century ago. Though initially trained in Sanskrit and Anthropology, he has devoted most of his career to the study of prehistory, protohistory, tribal ethnography, and evolution of Indian society. Besides his individual writings, he has collaborated with a number of his colleagues and students to write several hundred pages in English and Hindi. These include books, edited volumes, research articles, short notes, popular articles, book reviews, reminiscences, and obituaries. However, this annotated bibliography is limited to only the research articles in English. A list of all other publications has been given in Section III.

In this annotated bibliography each article has been given a serial number based on the name of the first author in case of multi-author articles. Except a few, most of the annotations are between 150-300 words. However, the size of the annotation does not reflect the size of the original article. The original words and terms used by Prof. Misra or his co-authors have been retained completely, yet the construction of sentences for the purpose of compacting the content is new.

Although I have learnt a few skills from Prof. Misra, I am not his formal pupil. I am student of his student, Dr. P.K. Thomas. There are two reasons why I have decided to do this annotation. I came to Deccan College in 1987 from two entirely different disciplines of biology and statistics. Since then I have been reading about history, anthropology and archaeology in connection with my daily work as well as for my personal interest in these subjects. I found that even early articles of Prof. Misra show his analytical attitude, meticulousness, methodological rigour (before it was formally discussed in these words in the form of New Archaeology), and carefully devised logical structure of argument. I felt it even more conspicuously when I reviewed Indian prehistoric studies to look for methodological rigour and quantitative frame of mind (Joglekar 2002 in *Archaeology and Historiography IV*- edited by S. Settar and Ravi Korisettar). I have had a long association with Prof. Misra as a junior colleague in the Institute and as an editor of his academic baby "*Man and Environment*". In reality, I am too junior to comment on his personality. In fact, he began his career before I was born. I would only dare to vocalise what I gained from him. All these years I found him to be encouraging and supportive, yet uncompromising on issues of correctness and precision writing. This work is an attempt to thank him for all that.

Several of Prof. Misra's students and colleagues helped me in this task of collection, reading and annotation. I am grateful to Drs. S.N. Rajaguru, P.K. Thomas, Sheila Mishra, A.K. Kanungo, and S.G. Deo. Also Prof. D.P. Agrawal and Dr. J.S. Kharakwal helped me in procuring a couple of photocopies from their collections. I thank them both.

SECTION I
Summary of articles

V-001: Misra, V.N. 1962a. Palaeolithic Industry of the Banas, Eastern Rajputana, *Journal of the Asiatic Society of Bombay* 34-35: 138-160.

The middle reaches of river Banas (Hamirgarh and Tonk), in Eastern Rajputana (Rajasthan) were explored between 1958 and 1961. Nine Palaeolithic sites were found: Hamirgarh, Sarupganj, Mandpia, Bigod, Jahajpur, Deoli, Banthali, Mahuwa and Tonk. Besides these, at Nathdwara a single handaxe-like triangular pebble tool was found. No fossils were encountered during the exploration. The article discusses the stratigraphic contexts, and the raw material used for making the tools. Ninety-six tools were collected of which 27 were recovered *in situ*. The collection contained choppers and scrapers made from pebbles and flakes (33), handaxes (35), cleavers (7), flakes (12), and cores (9). Twelve pebble chopper/scrapers have been described along with the measurements and illustrated. Similarly, several other tool types are also described and illustrated. Except one, all tools are made of medium to fine-grained quartzite. Heavy stone hammer technique was used to make most of the flakes and a few handaxes of crude variety. Light stone hammer technique was perhaps employed to produce pebble tools, most of the handaxes and cleavers. A small number of handaxes exhibit soft flake scars where flakes were removed by the "cylinder hammer technique" as

described by Leakey. Technologically the Banas implements are not of advanced type. The pebble tools are crude. Handaxes are mostly asymmetrical and thick. These are mainly belonging to the Abbevillean type and a few of Early to Middle Acheulian stage.

V-002: Misra, V.N. 1962b. Palaeolithic Culture of Western Rajputana, *Bulletin of the Deccan College Post-Graduate & Research Institute* 21: 86-156.

Though adjoining areas such as Gujarat and eastern Rajputana were investigated, till the mid 1950s western Rajputana was *terra cognita* in Indian prehistory. The article provides physiographic and geological background to the emergence of prehistoric cultures, and discusses the problem of figuring out climatic condition in the past. River Luni was explored from its source to Samdari in the middle reaches during 1958-1960 field seasons. This article reports archaeological findings at 17 sites located on river Luni and its tributaries such as Jojri, Guhiya and Sukri. Palaeolithic people used two types of raw material: quartzite, sandstone and siliceous materials, and lava rocks such as rhyolite and felspar porphyry. Most of the tools were made on flakes using four types of primary flaking techniques, viz. stone hammer, tortoise core, punch and cylinder hammer. The Palaeolithic industry of the Luni basin consists mainly of scrapers, points, flakes and blades. Representative tools of all the types are described and illustrated. The article provides quantitative information in the form of tables. Measurements of the illustrated specimens are recorded. The place of Western Rajaputana Palaeolithic sites in the context of Indian Palaeolithic phases and its terminology is discussed in detail.

V-003: Misra, V.N. 1962c. Problems of Terminology in Indian Prehistory, *Eastern Anthropologist* 15(2): 112-124.

At least three systems of naming Stone Age cultures were being used: (1) the European way of dividing the Stone Age into Palaeolithic, Mesolithic and Neolithic; (2) the South African method of recognizing Early, Middle and Late Stone Ages; and (3) classifying cultures into simple series as I, II and III. Because prehistoric studies in India were in an early stage, the author felt the need to have a fresh look at such terminologies. Important features, views of various scholars, and the criticisms of all the three systems are discussed. The author favours continuation of using the European terminology on the ground that it is precise and easy to understand.

V-004: Misra, V.N. and Malti Nagar 1963. Two Stone Age Sites on the River Chambal, Rajasthan, *Bulletin of the Deccan College Post-Graduate & Research Institute* 22: 156-169.

Earlier M.N. Deshpande (*IAR* 1953-54) and S.R. Rao ((*IAR* 1955-55) had described prehistoric artefacts from the Chambal, a major river in Rajasthan. These finds were not studied in detail and therefore the authors explored the river at Kota and Rawatbhata in 1961. This article describes archaeological discoveries at two sites - Kota (25° 10 N; 75° 52 E) and Rawatbhata (48 km upstream of Kota). A few artefacts from both the sites are described and illustrated. Ninety-six artefacts were found from gravel spread near the rail bridge at Kota. These include 62 Lower Palaeolithic tools such as pebble choppers, scrapers, handaxes, cleavers, cores and flakes. Six Middle Palaeolithic tools (Levallois flakes), and 23 Mesolithic tools (points, scrapers, blades, flakes and chips) were also found at Kota. The microliths were washed down from some nearby Mesolithic site, and were made of chalcedony. All the Lower Palaeolithic tools are made of quartzite. This raw material was available abundantly in the form of rounded pebbles. Most of these tools were rolled in varying degrees, and without much patination. S.R. Rao has reported presence of three terraces near Pratap Sagar Dam at Rawatbhata. The authors did not find any gravel or silt deposition in the area. Five Middle Palaeolithic tools were found here. These surface finds include two handaxes, and three partly/fully worked flakes. These flakes are similar to those found at Kota.

V-005: Misra, V.N. 1964. Palaeoliths from District Udaipur Rajasthan, *Journal of the Asiatic Society of Bombay* 36-37: 55-59.

The author explored river Berach and particularly the region from Udaipur to the east as far as Akola. Nine Palaeolithic tools were collected from three sites: Nathdwara (2), Dabok (1) and Kheri (6). These tools are described and measurements are provided. The artefacts from Nathdwara comprise one large and thick flake of micaceous quartzite, and one leaf-shaped pebble chopper. The artefacts from Kheri include three handaxes, one pebble chopper and two flakes. A single round scraper of

fine-gained quartzite was recovered from Dabok. The age of the tools is the same as that of the handaxe-cleaver industries in peninsular India. Although the collection is limited, it belongs to the Madrasian facies.

V-006: Misra, V.N. 1965a. Govindgarh, a Palaeolithic Site in Western Rajasthan, *Journal of the Asiatic Society of Bombay* 38: 205-208.

This article presents results of the exploration carried out (1959 and 1961) in the Ajmer district of Rajasthan. Area upstream of the confluence of the rivers Saraswati and Sagarmati was explored. Near the confluence at Govindgarh, Palaeolithic artefacts were found in a section on the right bank of Sagarmati. All four tools collected from this section are described. These comprise a long cleaver of quartzite (L=11.7 cm), a much rolled miniature cleaver (L=8.5 cm) of dark-brown quartzite, completely fresh pointed chopper (L=12.5 cm) of whitish-brown quartzite and unrolled rectangular flake side scraper (L=11.0 cm) of whitish-brown quartzite. The tools are of Lower Palaeolithic type. Since the evidence was limited, no generalizations were attempted.

V-007: Misra, V.N. 1965b. Mesolithic Phase in the Prehistory of India, in *Indian Prehistory: 1964* (V.N. Misra and M.S. Mate Eds.), pp. 57-85. Pune: Deccan College.

This article provides a comprehensive review of the Mesolithic cultural phase in India. It contains a thorough discussion of the meaning of the terms such as Mesolithic and microliths. The place of the Mesolithic in Indian prehistoric context, distribution of sites, chronology, and ecological background of this cultural phase are examined in detail. The evidence about various tool types found from several states in India is compiled and critically examined. Also the evidence of other artefacts like pottery, stone objects and copper tools. The article is followed by comments by H.D. Sankalia, B.K. Thapar, K.V. Soundara Rajan, R.K. Varma, G.R. Sharma, G.C. Mohapatra, K.A.R. Kennedy, A.K. Ghosh, P.C. Pant, and S.P. Gupta. These scholars have raised several questions and have cited pieces of evidence from other works. The questions were related to settlement pattern, rock shelters, paintings, human remains, and animal remains. At the end the author has replied to the questions. He pointed out that most of the Mesolithic sites are one-period sites and have to be assigned to Mesolithic only on cultural bases. He agrees to B.K. Thapar's suggestion that the relationship between the Mesolithic stone industries and those of Neolithic/Chalcolithic culture needs further investigation.

V-008: Misra, V.N. 1966. Stone Age Research in Rajasthan - A Review, in *Studies in Prehistory: Robert Bruce Foote Memorial Volume* (D. Sen and A.K. Ghosh Eds.), pp. 122-130. Kolkata: Firma K.L. Mukhopadhyaya.

Three discoveries of historical importance in Rajasthan are those of A.C. Carlleyle (1871-73), C.A. Heckett of the Geological Survey of India, and Seton-Karr in 1925 at Jhalawar. This article contains historical review of Stone Age research in Rajasthan. It highlights important evidence of all the phases of the Palaeolithic and the archaeology of Mesolithic culture found in the Berach basin in Udaipur, Chitorgarh (Chittaurgarh) and Bhilwara districts.

V-009: Misra, V.N. 1967. Prehistory and Protohistory, in *Review of Indological Research in Last Seventy-five Years* (P.J. Chinmulgund and V.V. Mirashi Eds.), pp. 351-425. Pune: Charitrakosh Mandal.

The main purpose of this article is to review of research in Indian pre- and protohistory. Close connection between archaeology and ancient literary traditions is emphasised. The review of prehistoric research highlights contributions made by R.B. Foote, L.A. Cammiade, M.C. Burkitt, Yale-Cambridge expedition in Punjab and Kashmir (1939), and H.D. Sankalia's and his students' work all over India. The meaning and scope of the terms Prehistory and Protohistory in Indian context, and various Stone Age cultures are discussed. The major cultural stages in prehistory are discussed in detail. These include Stone Age cultures, the Mesolithic phase, and the Indus civilization. Results of recent excavations at the Harappan sites of Lothal and Kalibangan are discussed. The spread of this civilization, climate, chronology, and its contacts with West Asian civilizations are examined. The characteristics of the post-Harappan cultures and the "Dark Age" of Indian history forms large portions of this review article. The topics dealt with are the Cemetery H culture and the Jhukar culture (Punjab and Sind), copper hoards and PGW evidence from Ganga valley, the Ahar culture and its ceramics, the Jorwe culture of

northern Deccan, the Neolithic culture of southern Deccan, and the problem of ash mounds.

V-010: Misra, V.N. 1968a. Middle Stone Age in Rajasthan, in *La Prehistoire: Problems et Tendances* (Francois Bordes and D. de. Sonneville-Bordes Eds.), pp. 295-302. Paris: Centre National de la Recherche Scientifique.

Recently a new phase of Palaeolithic culture, namely the Middle Stone Age has been found in Rajasthan. This culture is intermediate between the Lower Palaeolithic (Early Stone Age) and the Mesolithic (Late Stone Age). This article provides a summary of evidence for the existence of the Middle Stone Age in Rajasthan. The evidence is described in sections about the physical setting of Rajasthan, the stratigraphy, the archaeological assemblage (the Luni industry) and its characteristics. The Middle Stone Age is preceded by a well-developed Early Stone Age culture where the tools were handaxes, cleavers, pebble choppers and scrapers. These tools are mainly made of quartzite and rarely sandstone. In the Middle Stone Age the raw material used was siliceous rocks besides quartzite and sandstone. The proportion of flake tools increased in this period. The two cultural phases are more clearly distinguished in the proportion of retouched flake tools. It is concluded that both typologically and stratigraphically the Middle Stone Age evolved from the Early Stone Age in this region.

V-011: Misra, V.N. 1968b. Late Stone Age in Rajasthan, P*roceedings of the Rajasthan History Congress*, Jodhpur Session, pp. 16-22. Jaipur: Rajasthan History Congress.

Research during last fifteen years has brought to light 73 sites of Late Stone Age in Rajasthan of which only nine are found on the eastern side of the Aravallis. In eastern Rajasthan most of these sites are located on stony elevations on the gneissic plateau of Mewar. Raw material used for the microlithic industries consists of chert, quartzite, quartz and chalcedony. Archaeological finds from three sites (Nimbahera, Mandpia and Bagor) are described in detail. In western Rajasthan a few sites are better known than others. These are Sojat, Dhaneri, Jadan, Kanawas and Tilwara. The evidence from Kanawas suggests continuity of the Middle Stone Age tradition into the Late Stone Age. The archaeological material from the site of Tilwara in Barmer district has been described.

V-012: Misra, V.N. 1969. Early Village Communities of the Banas Basin, Rajasthan, in *Anthropology and Archaeology: Essays in Memory of Verrier Elwin* (M.C. Pradhan *et al.* Eds.), pp. 295-310. Mumbai: Oxford University Press.

The author points to a time gap between the Indus civilization and the beginning of historical period. This gap is filled by several Chalcolithic and Neolithic cultures. This article provides the background of pre-Iron Age cultures in Rajasthan and a brief summary of previous investigations. The author discusses alternate terms to be used for the newly discovered Chalcolithic culture and suggests that the name 'Ahar culture' is more apt than the name 'Banas culture'. Although the knowledge of this culture is limited, its important known features are described. These include ecological setting, settlement pattern, technological base, architecture, ceramics, terracotta objects and economy. The affinity of the sites such as Ahar and Gilund with those of West Asia suggests their early dates. With the help of available radiocarbon dates from Ahar the chronology of the sites is discussed.

V-013: Misra, V.N. 1970a. Cultural Significance of Three Copper Arrow-Heads from Rajasthan, India, *Journal of Near Eastern Studies* 29(4): 221-232.

Three copper arrowheads found at Bagor in Rajasthan are discussed. These unique finds were excavated during 1968-69 from two human burials of Phase II (Chalcolithic) at Bagor (25° 21' N; 74° 23' E). Arrowhead nos. 1 and 2 are of concave-based type whereas Arrowhead no. 3 is of barbed variety. These have been compared with those found from Harappan contexts and from sites outside India. The barbed type was found to be more close to the Aegean and Caucasus region types (of a later date than the Harappan period). Concave-based arrowheads are known from Persia and Transcaucasia. The study concluded that Bagor marks the eastern limit of the distribution of these types of arrowheads. Stone prototypes of arrowheads are completely absent in Indian Subcontinent and therefore, it is difficult to pinpoint the exact source of the arrowheads found at Bagor or at the Harappan sites.

V-014: Misra, V.N. 1970b. Evidence for a New Chalcolithic Culture in South Rajasthan, *Indian Antiquary* (Third Series) 4(1-4): 85-95.

In relation to newly excavated site of Bagor (1968-1970) the evidence of pottery and copper objects is discussed in detail. The earliest settlers at Bagor were purely hunter-gatherers while there is evidence of food production in Phase II. The archaeological finds from the Chalcolithic phase when compared to those from Ahar show that the two cultures are different. The copper arrowheads were compared to the Harappan arrowheads found at several sites (e.g. Harappa, Mohenjo-daro, Chanhu-daro, Sutkagen-dor). Only two minor differences were noticed. The Bagor arrowheads are likely to belong to the middle of the third millennium BC The author suggests that the Bagor and Harappan arrowheads could have been derived independently from the same or different sources.

V-015: Misra, V.N. 1971a. Two Microlithic Sites in Rajasthan - A Preliminary Investigation, *Eastern Anthropologist* 24(3): 237-288.

Two new sites - Bagor and Tilwara - were discovered during exploration (in 1967) in South Gujarat and the Luni River in Rajasthan. Limited digging was done at both these sites. Bagor (25° 21' N; 74° 23' E) yielded a total of 8546 stone artefacts of which more than 74% came from a 45 cm thick horizon (60-105 cm depth). A total of 362 finished tools includes blades, triangles, trapezes, crescents, points, scrapers, notched flakes, burins and borers. Bagor microlithic industry is typologically highly evolved and similar to that of Langhnaj in Gujarat. Several fragmented potsherds (997) were found during the excavation and their vertical distribution was uneven. Most of these (96.20%) came from top 75 cm deposit. The wares were classified into three types (A-C). A few sherds are described and illustrated. Other archaeological remains from Bagor were small fragments of burnt bricks from top 50 cm deposit, stone objects such as hammer stones (3), rubbers (3) and querns (2), and a single socketed iron arrowhead (length 6.7 cm) found at the depth of 60 cm. Except in top 30 cm, animal bones (3098 g) were found at all depths. On the basis of relative chronology, Bagor occupation was divided into three phases: I (before 2000 BC), II (c. 2000 BC) and III (500 BC to 200 AD).

The microlithic site at Tilwara (25° 51' N; 72° 50' E) is situated on the left bank of river Luni. A small trench (3.5 x 2.5 m) located in the central portion of the mound was dug. The habitation deposit was mainly confined to 50 cm. Excavation yielded 779 chipped pieces of which 86.5% were flakes and cores. The proportion of waste was more and finished tools were only 1.5%. Most of the tools were made of rhyolite (highly siliceous volcanic rock). A total of 261 potsherds was recovered which contained Red Ware (71.64%) and Grey Ware. A few sherds are described. Other finds included stone pieces, kankar blocks, baked clay lumps, a piece of iron nail, and animal bones. Measurements of the tools from both the sites were taken and the article provides summary statistics of select parameters. Five radiocarbon dates are given in the postscript.

V-016: Misra, V.N. 1971b. Two Late Mesolithic Settlements in Rajasthan - a Brief Review of Investigations, *Poona University Journal* (Humanities) 35: 59-79.

This article provides a summary of excavation results obtained at two Mesolithic sites (Bagor and Tilwara) in Western Rajasthan. The archaeological finds at Bagor such as pottery, microliths, copper objects, iron objects, ornaments, stone objects, structural remains and human burials, are discussed in detail. The relative chronology of the three phases of occupation at Bagor was presented in the earlier article (1971). Here with five radiocarbon dates it is suggested that Phase I ranges from c. 5000 to 2800 BC, whereas Phase II perhaps extends to the middle of the second millennium BC The faunal studies done by D.R. Shah and K.R. Alur showed that both animal husbandry and hunting were practised together in Phase I.

At Tilwara also the microlithic site occurs in a sand dune. In the central portion an area of 16 x 5 m was excavated where habitation deposit was about 90 cm. The microlithic industry is essentially similar to that of Bagor. The main tool types were blades with flat retouch, blunted back blades, and symmetric and asymmetric points on blades, crescents, triangles and trapezes. No copper tools were found at Tilwara. Tilwara pottery is entirely wheel-made and different from that at Bagor. Red Ware and Grey Ware sherds are almost equal in proportion. The faunal material studied by D.R. Shah points to a mixture of domestic and wild fauna. Spherical stone balls found in the excavation possibly were used for hunting.

V-017: Misra, V.N. 1971c. Stone Objects from Navdatoli, in *Chalcolithic Navdatoli* (H.D.

Sankalia, S.B Deo and Z.D Ansari), pp. 323-350. Pune: Deccan College.

More than 1500 stone objects were found at the Chalcolithic site of Navadatoli in Madhya Pradesh. This article reports analysis of these stone objects excluding blades. Six types of stone objects were found. These comprise 36 ring stones, 620 sling balls, 338 hammer stones, 31 hammer stone-anvils, 400 grinding stones and 67 querns. All these were thoroughly examined with respect to raw material, size, shape, weight, stratigraphic contexts, and distribution within the excavated trenches. Ring stones are made of a variety of materials like quartzite, sandstone, basalt and quartz. The article discusses evidence against the 'weight theory' related to the function of the sling balls.

V-018: Misra, V.N. 1972a. Prehistoric Burials from Bagor, Rajasthan, in *Archaeological Congress and Seminar Papers* (S.B Deo Ed.), pp. 58-65. Nagpur: Nagpur University

The main focus of this article is to describe the human burials found during the excavation at Bagor (25° 21' N; 74° 23' E), a Mesolithic site in Rajasthan. A summary of archaeological deposit, three phases of occupation and animal bones is provided. Five human burials were found. Burial I found at a depth of 1.20 m contained the skeleton of an adult. The body was laid on its back and a small stone was kept over the face. No objects were found other than a few animal bones found normally with habitation debris. Burial II (at 1.10 m depth) contained poorly preserved skeletal elements of an adult. The grave goods were four clay pots, a copper spearhead, a copper arrowhead, a copper awl, beads (35) and animal bones. Burial III (at 0.88 m depth) was not well-preserved and it contained a small carinated pot kept over the face. Burial IV found at 0.98 m depth is best preserved among the five burials. The body was laid in fully extended position in N-S direction. There were no burial goods here. Burial V found at 1.0 m depth had a circle of stones on the surface covering it. This burial contained several offerings one large animal bone, clay pots (8) and copper arrowheads (2). The arrowheads have two parallel holes near the base.

V-019: Misra, V.N. 1972b. Evolution of Palaeolithic Cultures in India, in *The Origin of Homo Sapiens* (Francois Bordes Ed.), pp. 116-120. Paris: UNESCO.

This article presents a compact summary of prehistoric research conducted in India for about two decades. Though no human remains prior to about 3000 BC have been found, evidence of Palaeolithic cultures is found at many sites in India. The studies reviewed include those of pebble-tool Soan culture (West Pakistan), Acheulian culture of peninsular India and its associated faunal remains, flake-tool industries of Rajasthan, Uttar Pradesh, Gujarat, Madhya Pradesh and the Deccan. In several areas the Middle Palaeolithic industries are followed by blade and burin industries. The author opines that these blade and burin industries represent the culture of Modern Man in India. The Upper Palaeolithic site in the Kurnool district is discussed pointing that evidence of this phase is scanty.

V-020: Misra, V.N. 1972-73. New Light on the Mesolithic Period in India from Excavations at Bagor in Rajasthan, *The Researcher* 12-13: 1-14.

A brief account of excavation conducted at the Mesolithic site of Bagor in Western Rajasthan is provided. A compact area of 20 x 12 m was selected for excavation where three cuttings were dug (marked E to G). The microliths found during the excavation are compared to those found outside India. The article contains a discussion of the economy of Bagor people. The Bagor culture belongs to a wider culture complex that extends to North Gujarat plain and to the Luni basin. The Middle Palaeolithic culture in the valleys of Wagan and Kadmali rivers immediately precedes the Mesolithic culture at Bagor. The blade element in the Middle Palaeolithic culture is too underdeveloped to be ancestral to the microlithic industry of Bagor.

V-021: Misra, V.N. 1973a. Problems of Palaeo-ecology, Palaeo-climate and Chronology of the Microlithic Cultures of Western India, in *Radiocarbon and Indian Archaeology* (D.P. Agrawal and A. Ghosh Eds.), pp. 58-72. Mumbai: Tata Institute of Fundamental Research.

This article covers the microlithic remains found in three areas in western India namely North Gujarat, South-west Rajasthan and South-east Rajasthan. The material remains from Langhnaj, Bagor, Tilwara and Pavagarh (central Gujarat) are discussed in relation to the ecological conditions and climate in the past. The nature of human occupation and the formation of sand dunes

showed that sand was getting deposited seasonally. The associated fauna suggests that an open thorny forest and thin soil cover existed. The article also contains discussion about chronology and investigations around the lakes in Rajasthan. It is concluded that for several thousands of years North Gujarat had perhaps much drier climate than today.

V-022: Misra, V.N. 1973b. Bagor - A Late Mesolithic Settlement in North-West India, *World Archaeology* 5(1): 92-110.

This article provides an overview of excavation at the Mesolithic site of Bagor (25° 21' N; 74° 23' E) in eastern Rajasthan. Ten trenches of 4x4 m and five trenches of 4x2 m were dug in the centre of the Mahasati mound. The archaeological finds at Bagor discussed earlier (1971) are discussed in detail along with the chronology of three phases of occupation at Bagor. The artefacts include a variety of microliths, copper objects (5), iron arrowheads (2), pottery of two main fabrics. Phase II pottery (Type A) is gritty and made of micaceous clay. Phase III (type B) pottery is entirely different and has no connection with type A pottery. Five burials were found (three in Phase II and one each in Phase I and III). In phase I burial no grave goods were found, although a few animal bones were found in the vicinity. Burials of both Phases I and II are poorly preserved. Burials of Phase II contain offerings in the form of pottery, ornaments, metal objects and animals bones, the last no doubt originally kept as chunks of meat. Phase III burial, because of the association of a medieval coin, is considered to be of a later period and it actually does not belong to Phase III. Animal remains and various aspects of the food economy are discussed. It is suggested that initial settlers at Bagor were hunters and herders, but later the role of hunting declined and pastoralism increased.

V-023: Misra, V.N. 1973c. A New Prehistoric Ceramic from Rajasthan, *East and West* 23(3-4): 295-305.

This article is aimed at describing the pottery found at the Mesolithic site of Bagor (25° 21' N; 74° 23' E) in eastern Rajasthan and its place in prehistoric ceramic typology. Also, a summary of excavation, trenches, artefacts and general observations at the site is provided. It is suggested that the ceramic found at Bagor is distinctive and be named "Bagor ware". The main features of this ware are described and a few pots are illustrated.

V-024: Misra, V.N. and Malti Nagar 1973. Twenty-five Years of Indian Prehistory (1947-1972) - A Review of Research, in *Man and Society* (K.S. Mathur and S.C. Varma Eds.), pp. 1-54. Lucknow: Ethnographic and Folk Culture Society.

This article gives a comprehensive review of prehistoric research conducted in India from 1947 to 1972. A section on the research before 1947 includes works of Col. Meadows Taylor (1842), H.P. Le Mesurier (1861) and contributions made by the Archaeological Survey of India. Several seminars and conferences organized, especially after 1960 provided opportunities for scholars to discuss the emerging archaeological problems. Also the importance of publications by people like D.H. Gordon, Stuart Piggott, H.D. Sankalia, Bridget and F.R. Allchin and W.A. Fairservis Jr. is highlighted. All the major cultural stages in prehistory are discussed in detail along with a thorough discussion of the Stone Age terminology. The culture-wise review of research contains sections dealing with Acheulian culture, Quaternary studies, the Upper Palaeolithic and the Mesolithic phase, emergence of settled village life, the pre-Harappan cultures in northwest India, Burzahom Neolithic culture, the Indus civilization and its characteristics (chronology, spread and decline), Neolithic culture of South India and the ashmounds. The article also includes a review of explorations and excavations related to the Chalcolithic cultures of the Deccan, Central India and Rajasthan, the Megalithic remains, protohistoric art, importance of ethnoarchaeology, metallurgy, human remains, animal remains, plant remains, radiocarbon dating. Authors conclude that so far the work was more of the exploration type and pertained to collection of artefacts, and suggest that more horizontal excavations are needed in future.

V-025: Misra, V.N. 1974a. Archaeological and Ethnographic Evidence for the Hafting and Use of Microliths and Related Tools, *Puratattva* 7: 3-12.

At several places in India prehistoric tools are found. The microlithic tools (e.g. spearheads, arrowheads, sickles and knives) discovered in abundance at many sites are being described. However, our knowledge of the use of tools, and of their function is limited. In recent years archaeologists have focused their attention on such issues. Many of these microliths were hafted in suitable shafts. This article provides several

examples of such usage from all over the world and highlights importance of ethnographic studies in interpreting the tool use in the past.

V-026: Misra, V.N. 1974b. History and Archaeology – Need for a New Understanding, *Prachya Pratibha* 2(1): 8-14.

A general picture of Indian public perception about the past is that history is mainly the story built from written records. It is a common belief that history is concerned with kings, battles and dates. This is mainly due to the way history is taught in our educational system. The period of man's prehistoric past is vast and our understanding of this period is entirely dependent on the archaeological discoveries and excavations. The author shows the important role that archaeology plays in historical reconstruction of the past. In Western countries archaeology is increasingly becoming popular. Although archaeological activity in India is quantitatively more in than many other countries, it is often limited to academic circles. The need to educate public with exhibitions of antiquities and popular articles is highlighted.

V-027: Misra, V.N. 1976a. The Acheulian Industry of Rock-shelter III F-23 at Bhimbetka, Central India, *Puratattva* 8: 13-36.

The site of Bhimbetka (22° 50' N; 77° 37' E) is located in the Raisen district of Madhya Pradesh in Central India. Several caves and rockshelters are scattered in the Vindhyan hills of which about 500 contain paintings on their walls and ceilings. V.N. Misra excavated an area of 52 m^2 inside the rock shelter III F-23 for three years (1973-1975). In all eight layers were recognised in 3.80 m thick deposit. The artefact assemblage (n=4705) consisted of flakes (1378), cores (155), chips (1260) and debris (183) besides the shaped tools (1501). The industry belonged to the Acheulian culture. The proportion of side-scrapers and other non-biface tools was more (n=1322) while the handaxes and cleavers accounted for only 179 specimens. The article describes and illustrates the artefacts and provides statistical data of their distribution within the deposit. The material remains from this rock shelter were compared with following other Acheulian sites.

Site	Geo-co-ordinates	Studied/Excavated by
Bhimbetka, (shelter III F-24) Madhya Pradesh	22° 50' N; 77° 37' E	V.S. Wakankar
Lalitpur, Uttar Pradesh	24° 42' N; 78° 25' E	R. Singh (1965)
Chirki-Nevasa, Maharashtra	19° 30' N; 74° 50' E	G. Corvinus (1966-68)
Anangwadi, Karnataka	16° 15' N; 75° 40' E	R.S. Pappu (1965)
Adamgarh, Madhya Pradesh	22° 45' N; 77°43' E	R.V. Joshi and M.D. Khare (1964)
Mahadeo Piparia, Madhya Pradesh	23° 06' N; 79° 16' E	S.G. Supekar (1963 and 1965)
Kuliana, Orissa	22° 04' N; 86° 39' E	N.K. Bose and D. Sen
Hunsgi, Karnataka	16° 27' N; 76° 31' E	K. Paddayya

V-028: Misra, V.N. 1976b. Ecological Adaptations During the Terminal Stone Age in Western and Central India, in *Ecological Backgrounds of South Asian Prehistory* (K.A.R. Kennedy and G. Possehl Eds.), pp. 28-51. Ithaca: Cornell University.

The Late Stone Age (Mesolithic phase) research conducted in Gujarat, Rajasthan, Madhya Pradesh and the Ganga Valley in Uttar Pradesh has been reviewed. Physiographic background of all these regions has been provided. Mesolithic culture sites examined from Gujarat were Langhnaj, Akhaj, Valasana and Hirpura. The sites of Bagor, Pachpadra salt basin and Tilwara from Rajasthan have been compared to other sites. Archaeological finds in relation to the radiocarbon dates described in detail from these sites include animal bones and microlithic industry. The finds from the rock-shelter site of Lekhahia (24° 30' 5" N; 82° 32' E), and Bhimbetka in Central India were examined. Ten sites discussed from Ganga Valley include Jhiri, Garha, Sarai Nahar Rai, Kurha and Bicchia. This study highlights the nature of human adaptations at the end of terminal Stone Age. The hunter-gatherers have adapted to diverse ecological settings such as the rocky plains of Mewar and hilly-forested areas of Central India. The technological equipment and the economic patterns of these human groups show variation.

V-029: Misra, V.N. 1976c. Prehistory and Palaeoenvironment in Rajasthan, in *Archaeology and Palaeoenvironment in Western India* (D.P.

Agrawal and B.M. Pande Eds.), pp. 31-54. New Delhi: Concept.

This article provides a brief account of prehistoric research conducted in Rajasthan and the features of the Lower Palaeolithic to the Mesolithic cultures. Also, emergence of early farming communities and the evidence of OCP and PGW cultures are discussed. The environment of the Palaeolithic period has been examined using pedological and palynological data. Gurdip Singh's scheme of climate changes is discussed. It is suggested that there was an increase in rainfall at the beginning of the Holocene period. However, the archaeological evidence does not point to a very wet climate. There is not adequate information to support Gurdip Singh's inference and therefore, it should be considered as a working hypothesis. At the end of this article the author's replies to questions raised by Subrata Sinha and K.T.M. Hedge are also given.

V-030: Misra, V.N. 1976d. Evidence of Culture Contact between Terminal Stone Age Hunter-gatherers and Contemporary Farmers, in *Archaeological Congress and Seminar: 1972* (U.V. Singh Ed.), pp. 115-121. Kurukshetra: Kurukshetra University.

This article provides a thorough review of research on the Mesolithic culture sites from Western and Central India. Microliths were used until the early centuries of the Christian era. Although the data is not voluminous, it is adequate to infer about the microlith-using communities at the end of the Late Stone Age. Wherever the microlith-using communities were living close to copper/iron-using settled farmers, they obtained metal tools, pottery and other objects. Though iron tools were acquired, the economy continued to be dependent on hunting and gathering or these people partially adopted food production. The sites discussed from Gujarat and Rajasthan are Langhnaj, Bagor and Tilwara. The archaeological remains from several sites in Madhya Pradesh are examined. These include Bhimbetka and Putli Karar (Raisen district), Adamgarh (Hoshangabad district) and Dorothy Deep rock-shelter site near Pachmarhi. Besides these, Todd's report on microliths found on Salsette Island on the west coast has been discussed.

V-031: Misra, V.N. and Malti Nagar 1976. Prehistoric Background of Rajasthan, in *Somasekhara Sarma Commemoration Volume* (R. Subrahmanyam and N. Ramesan Eds.), pp. 345-59. Hyderabad: Government of Andhra Pradesh.

This article summarises results of prehistoric research conducted in Rajasthan so far by giving an introduction to the geographic setting. Prehistoric cultures in Rajasthan are divided into following phases: earliest hunter-gatherers (the Lower Palaeolithic), advanced hunter-gatherers (the Middle Palaeolithic), final hunter-gatherers (the Mesolithic), beginning of settled village life (the Chalcolithic), beginning of urban life (the Indus civilisation), and the expansion of settled village life (the Iron Age). The archaeological finds from the sites of these periods are discussed by giving their nature, chronology, features and spread.

V-032: Misra, V.N. 1977. Evolution of the Pattern of Human Settlement in the Arid and Semi-arid Region, in *Desertification and its Control* (P.L. Jaiswal, R. Singh, N.N. Chhabra and K. Sundararaman Eds.), pp. 10-24. New Delhi: Indian Council of Agricultural Research.

Due to recent prehistoric research it is possible to view the process of human evolution and colonization in arid and semi-arid parts of India. The focus has been on work done in Gujarat, Rajasthan and Haryana. The review of research is related to the human cultures during the Lower Palaeolithic, Middle Palaeolithic, Upper Palaeolithic, and Mesolithic phases. Also the changes due to food production and settled life during the Chalcolithic-Bronze Age and the Iron Age were examined. The environmental conditions during this period and the human adaptations are discussed. The author concludes that it is difficult to reconcile the archaeological evidence known so far and the climatic picture presented by Gurdip Singh.

V-033: Misra, V.N. 1978a. Prehistoric Cave art of Bhimbetka, Central India, in *Conservation of Rock Art* (C. Pearson Ed.), pp. 69-70. Canberra: Institute for the Conservation of Cultural Material.

More than 90 per cent rock art sites known so far are found in the sandstone hills (the Kaimurs, the Vindhyas and the Mahadeo) of Central India. The site of Bhimbetka in Raisen district (Madhya Pradesh) is the richest among these where more than 200 caves and rock-shelters have been found. Also, more than 500 such places in adjoining hills have paintings. Excavations of some select rock-

shelters show that humans have occupied these places from Acheulian to Mesolithic times. Based on style and superimposition, the paintings were classified into two cultural-chronological phases (prehistoric and historic). The contents, subjects, painting styles and dating of these rock art specimens have been described. The paintings at Bhimbetka are in various stages of preservation. These need conservation efforts since both human and natural factors are responsible for their destruction.

V-034: Misra, V.N. 1978b. Acheulian Industry of Bhimbetka, Central India, *Bulletin of the Indo-Pacific Prehistory Association* 1: 130-173.

This article provides a brief review of the excavation conducted at the site of Bhimbetka (22 50' N; 77 37' E), located in the Raisen district of Madhya Pradesh in Central India. It is mainly concerned with the rock shelter III F-23. Several other Acheulian sites have been used to compare the results of Bhimbetka excavation. These are Lalitpur (Uttar Pradesh), Chirki-Nevasa (Maharashtra), Adamgarh and Mahadeo Piparia (Madhya Pradesh), Kuliana (Orissa) and Anangwadi and Hunsgi (Karnataka).

V-035: Misra, V.N. 1978c. Explorations in Ajmer and Jaipur Districts, Rajasthan, *Man and Environment* 2: 74.

As a part of the multi-disciplinary project on the early man and his environment in north-western India, the author along with his colleagues S.N. Rajaguru and P.K. Thomas, explored Ajmer and Jaipur districts of Rajasthan in 1976. Exposed fluvial sediments in the upper reaches of river Luni and sand dunes (aeolian sediments) were investigated. Two generations of sand dunes were recognised. Mesolithic sites were found on the deflated portions of the older sand dunes at Nawa, and on the old terrace of the Saraswati river near Govindgarh. Other sites explored were Budha Pushkar and Benara. Preliminary observations suggest that the climate was extremely dry during the closing phase of the Pleistocene.

V-036: Misra, V.N. and Y. Mathpal 1979. Rock Art of Bhimbetka Region, Central India, *Man and Environment* 3: 27-33.

In 1958 V.S. Wakankar discovered the rich complex of rock art sites at Bhimbetka in the Vindhyan Hills (Raisen district, Madhya Pradesh). The authors have described the location, forest cover, climatic conditions, people living now and historical evidence (i.e. Gupta inscriptions and Paramara temple ruins) available from this area. Paintings are found on the walls and ceilings of the rock shelters as well as on vertical cliff faces. Based on style, colour and superimposition 16 layers of paintings have been recognised. The study of 133 caves on the main Bhimbetka hill revealed that 16 colours have been used and 12 painting styles could be identified. These have been grouped into 9 chronological activity units: Phases A to E (Prehistoric), Phase F (transitional/Chalcolithic) and Phases G to I (Historic period). This article provides a discussion about the relative chronology, painting techniques and contents of paintings of various phases.

V-037: Misra, V.N. 1980. The Acheulian Industry of Rock-Shelter IIIF-23 at Bhimbetka, Central India - A Preliminary Study, *Australian Archaeology* 8: 63-106.

This article presents results of the excavation carried out by the author inside the rock-shelter III F-23 at Bhimbetka (22° 50' N; 77° 37' E) in Central India (Raisen district of Madhya Pradesh). The archaeological stratigraphy, tool types and their frequencies, techniques of tool production and other features have been described. Detailed information is provided in form of elaborate tables, line drawings, and photographs. Bhimbetka Acheulian industry is characterised by low proportion of bifaces, high standard of workmanship in biface preparations and high proportion of cleavers to handaxes. This industry has close similarities with the Mousterian of Acheulian tradition. The archaeological material from rock-shelter III F-23 has been compared to that from rock-shelter III F-24 excavated by V.S. Wakankar at Bhimbetka and several other Indian sites. The other sites used for comparison are Chirki-Nevasa (Maharashtra), Lalitpur (Uttar Pradesh), Anangwadi and Hunsgi (Karnataka), Mahadeo Piparia and Adamgarh (Madhya Pradesh), and Kuliana (Orissa). The appendix by S.N. Rajaguru provides sedimentological observations, fossil evidence from Narmada River and conclusions about the palaeoenvironment at Bhimbetka.

V-038: Misra, V.N., S.N. Rajaguru, R.J. Wasson, G. Singh and D.P. Agrawal 1979-80. Further Light

on Lower Palaeolithic Occupation and Palaeoenvironment in Semi-arid Zone of Rajasthan, *Puratattva* 11: 11-18.

In 1979 V.N. Misra, S.N. Rajaguru and D.P. Agrawal discovered a Lower Palaeolithic site near Jayal (27° 13' N; 74° 11' E) in Nagaur district of Rajasthan. Tools were found to a depth of 0.50 m in primary gravel and to depths of several metres in the re-deposited gravel. On the basis of sedimentological and geomorphological data the gravel ridge (15 km long) on which artefacts are scattered has been dated tentatively to the Early Pleistocene. In 1980 the authors discovered another Acheulian site at Didwana (37° 24' N; 74° 35' E), also in Nagaur district. This article describes the state of preservation of the localities near Didwana (Singi Talav, Amarpura and Indola ki Dhani), the stratigraphy, and archaeological finds. The assemblage (n=130) contained tools (handaxes, scrapers and choppers) as well as debitage. The sites of Didwana are located in low-energy fluvial formation and in primary context. The article provides a discussion of environment around Didwana during the Acheulian culture.

V-039: Misra, V.N., S.N. Rajaguru, D.P. Agrawal, P.K. Thomas, Z. Husain and P.S. Datta 1980. Prehistory and Palaeoenvironment of Jayal, Western Rajasthan, *Man and Environment* 4: 19-31.

In 1979 a team of scientists and archeologists studied the extensive gravel ridge near Jayal (Nagaur district, Rajasthan) with the aim to collect evidence of earliest human occupation in that area. The geological setting, various rock units, origin of the gravel, nature of Quaternary formations near Jayal (27° 13' N; 74° 11' E) and probable age of its deposition have been described. Several small trenches (1 x 1 m) were dug at Jayal. All the artefacts were made of quartzite. Of the total 456 artefacts, most (82.02%) were flakes and cores. The finished tools include scrapers, handaxes and a single cleaver. Trial excavation was conducted at three places on the gravel ridge at Chhajoli where tools were found in three gravel layers. Main tool types were scrapers, handaxes, choppers, chopping tools, denticulates, knives and truncated flakes. Also, controlled surface collection (n=433) was done from an area of 4 x 4 m on the midslope of a gravel ridge near Rata Nadi pond.

A-040: Agrawal, D.P., P.S. Datta, Zahid Hussain, R.V. Krishnamurthy, V.N. Misra, S.N. Rajaguru and P.K. Thomas 1980. Palaeoclimate, Stratigraphy and Prehistory in North and West Rajasthan, *Proceedings of the Indian Academy of Sciences* 89(1): 51-66.

The authors provide a brief review of previous palaeoenvironmental research carried out in Rajasthan. Quaternary formations in Rajasthan are of fluvial and aeolian origin. The fossil gravel ridge at Jayal in Nagaur District is one of the earliest Quaternary formations so far recorded in this region. A rich palaeolithic site has been discovered in association with the gravel ridge. This article discusses data about past climate changes coming from multiple sources. It is suggested that the oscillations have been between arid and semi-arid phases rather than between semi-arid and humid phases.

A-041: Agrawal, D.P., R.P Dhir, R.V. Krishnamurthy, V.N. Misra, S.C. Nanda and S.N. Rajaguru 1980. Multiple Evidence for Climatic Change in Rajasthan, in *Arid Zone Research and Development* (H.S. Mann Ed.), pp. 1-18. Jodhpur: Scientific Publishers.

To understand palaeoclimatic changes in Rajasthan, quartz grains from *kankar*-based and *kankar* free deposits were examined. The technique of SEM (scanning electron microscopy) was used. The main focus of the work was on the sites of Chirai, Chamu and Gudlai that are located near Jodhpur. Also, the Bap Boulders from Bap near Jodhpur were studied. The findings showed that there is no possibility of glaciation extending into Rajasthan during the Quaternary. Mineralogical and chemical analyses of Malhar Rann sediments suggested that lake levels in the past fluctuated significantly. The climate sequence found in this study matches with those in north Rajasthan and Kashmir.

V-042: Misra, V.N. 1981. The Prehistoric Rock Art of Bhimbetka, Central India, *Journal of the National Centre for the Performing Arts* 10(1): 1-16.

A.C.L. Carlleyle in 1867-68 first discovered rock paintings in India. The author provides a brief review of the distribution of rock art sites in general and work done since then. Several rock-shelters and caves at Bhimbetka in Raisen district

(Madhya Pradesh) have paintings on the walls and ceilings. Excavations of a few rock-shelters have proved that humans have occupied these since the Lower Palaeolithic times (more than 100,000 years). The locations, colours used, background of the paintings, themes, nature of depictions, motivation behind the paintings, painting techniques, state of preservation and chronology of the rock art are described. The subjects of the early art at Bhimbetka are related to nature, animals and hunting-gathering way of life. Paintings of Phase VI show transition between the early hunting-gathering economy and the settled farming economy. The paintings of Phases I-V antedate the second millennium BC The paintings of Phase VII-IX (500 BC to AD 1000) are many but poor in quality. The subjects of these phases are more often battle scenes, royal processions, elephants, horse riders and soldiers.

K-043: Kennedy, K.A.R., C.B. Burrow and V.N. Misra 1981. Dental Mutilations from Prehistoric India *Current Anthropology* 22(3): 285-86.

Human skeletal remains from the rock-shelter site of Bhimbetka, Raisen district in Madhya Pradesh were examined. V.N. Misra excavated the skeleton of an adult male found in burial no. 4 in 1977. The body was laid in supine position. The person was 23-27 years of age at the time of death. The grave goods were a partially ground antler fragment and rubbing stone. This skeleton and five others are assigned to 8000 BP The incisors showed intentional mutilation marks termed lines or groove pattern mutilations. The incisors were deliberately engraved. The dental operation seems to have been performed using a microlith or a sharp and hard edge.

K-044: Krishnamurthy, R.V., D.P. Agrawal, V.N. Misra and S.N. Rajaguru 1981. Palaeoclimatic Inferences from the Behaviour of Radiocarbon Dates of Carbonates from Sand Dunes of Rajasthan, *Proceedings of the Indian Academy of Sciences* 90(2): 155-160.

Although radiometric dating has been done earlier using pedogenic carbonates to study the process of pedogenesis, carbonates have been used on a limited scale as the indicators of palaeoclimatic conditions. Such a possibility was tested using pedogenic carbonates from the sand dune at Budha Pushkar (26° 30' N; 74° 36' E) in Rajasthan. The sizes of the carbonates in the dune were too large to be carried by the migratory dunes. Calcium carbonate occurs as a thin crust at the top indicating dune stabilisation, and as discrete units of root-casts within the dune profile. Representative samples of root-casts were examined. Based on the study of the carbonates, a model for palaeoclimate changes during past 6000 years has been presented. The stabilisation of the dune occurred around 6500 years BP suggesting a wet phase. After a relatively drier phase the conditions became wetter again from about 5000 years BP. This phase continued until 3000 years BP and had minor fluctuations. The most significant shift from the dry to wet phase perhaps took place between 5000 and 4500 years ago. These results were in agreement with those based on pollen data.

V-045: Misra, V.N. and Malti Nagar 1981. The Microlithic Industry of Bagor, Rajasthan, in *Cultural Contours of India* (V.S. Srivastava Ed.), pp. 6-11. Delhi: Abhinav.

During the excavation at the Mesolithic site of Bagor (Rajasthan) an area of 224 m^2 was dug. The results of this work are described. The study includes the microlithic industry, chronology based on radiocarbon dates, horizontal and vertical distribution of artefacts. Bagor microlithic industry has been compared to those from other sites such as Mandpia on river Banas near Bagor, Nimbahera on river Kadmali, Langhnaj, Kanawas and Sojat.

V-046: Misra, V.N. 1982a. The Evolution of Blade Element in the Stone Industries of Bhimbetka, Central India, in *Indian Archaeology*: *New Perspectives* (R.K. Sharma Ed.), pp. 7-13. Delhi: Agam.

Rock shelter III F-23 at the site of Bhimbetka (Raisen district, Madhya Pradesh) in Central India was excavated during 1973-75. The habitation deposit (3.90 m) was divisible into eight layers. The excavation yielded a total of 32036 artefacts made on quartzite. These include handaxes, cleaves, blades, microblades, flakes, chips and debris. These artefacts belonged to various cultural phases: Acheulian (58.46%), Middle Palaeolithic (26.56%), Upper Palaeolithic (7.87%) and Mesolithic (7.11%). Metrical analysis of the artefacts is provided in tabular format. The study revealed that (1) the proportion of blades increases steadily from the Acheulian to the Mesolithic phase, and (2) there was reduction in size of the

blades and microblades during the same time period.

V-047: Misra, V.N. 1982b. Bagor: the Archaeological Setting, in *Bagor and Tilwara: Late Mesolithic Cultures of Northwest India I: The Human Skeletal Remains* (J.R. Lukacs, V.N. Misra and K.A.R. Kennedy Eds.), pp. 9-26. Pune: Deccan College.

The site of Bagor in district Bhilwara (Rajasthan) was excavated by V.N. Misra from 1968 to 1970. Five human burials were found. These were examined in detail by K.A.R. Kennedy and J.R. Lukacs. This article provides details of the excavation, stratigraphy, chronology, cultural sequence and human burials. One human skeleton belonged to Phase I (cal. 5400-5000 BC) and three were found from Phase II (cal. 4600-3200 BC). The fifth skeleton was from the Late Historic period and not connected with the habitation at the site.

V-048: Misra, V.N. and S.N. Rajaguru 1982. Environment during the Quaternary Period in Western India. *Proceedings of the Workshop on Problems of Deserts in India*, pp. 129-140. Jaipur: Geological Survey of India.

This article presents new geoarchaeological evidence related to western Indian Quaternary environments. Four areas from the semi-arid parts of Rajasthan and southern Saurashtra have been taken as examples. These were (1) the Middle Palaeolithic sites from the Luni Basin in Western Rajasthan, (2) the Mesolithic site of Tilwara in Barmer district of Rajasthan, (3) the Mesolihtic site of Bagor on river Kothari in Bhilwara district of Rajasthan, and (4) the Lower Palaeolithic site of Umrethi in Hiran Valley (Saurashtra). The evidence points that human occupation in these regions began in the mid-Pleistocene. The composite stratigraphy of the Quaternary Formations up to 44 m depth from the surface has been provided. R.N. Ghosh raised a question about the conclusion regarding wind blown sand. The reply given was that micromorphological technique has been used to study aeolian sediments.

V-049: Misra, V.N., S.N. Rajaguru, D.R. Raju, H. Raghavan and C. Gaillard 1982. Acheulian Occupation and Evolving Landscape around Didwana in the Thar Desert, India, *Man and Environment* 6: 72-86.

Intensive explorations were carried out near Didwana in Nagaur district (Rajasthan) and subsequently two sites (Singi Talav and Indola-ki-Dhani) were excavated. This article provides discussion on Quaternary stratigraphy and associated Palaeolithic material in three geological Formations (Didwana, Amarpura and Jayal). Archaeological material from other sites such as Singi Talav Quarry (n=215), Amarpura (n=41), Bangur Canal (n=131), Jankipura (n=221), Koliya I (n=258), Koliya II (n=63), Mangalpura (n=91), Shyampura (n=14), and Jenana (n=31) is briefly described. With the help of new archaeological material and field observations, the authors have presented a picture of man-land relationship during the Quaternary.

G-050: Gaillard, C., D.R. Raju, V.N. Misra and S.N. Rajaguru 1983. Acheulian Occupation at Singi Talav in the Thar Desert: a Preliminary Report on 1982 Excavation, *Man and Environment* 7: 112-130.

The Acheulian site of Singi Talav near Didwana in the Thar Desert of Rajasthan was excavated earlier in 1981. It raised a question about variable preservation of artefacts (fresh in layers 3-4 and rolled in layer 5). To find out answers to several questions related to human occupation, occurrence of kankar blocks, evolution of lithic tools and end of the human occupation the site was excavated again in 1982. This article provides information on stratigraphy, tool typology, raw material used for making tools, and quantitative information gathered during second season's digging. It is concluded that the Acheulian site of Singi Talav-1 was often flooded and was occupied thrice. The fresh artefacts are perhaps in their original location.

A-051: Agrawal, D.P., S.K. Gupta, V.N. Misra, R.K. Pant, S.K. Tandon and A.B. Vora 1983. A National Grid for Environmental Research and Planning, *Man and Environment* 7: 78-86.

Though in recent years several studies concerning environment have been done, there are two lacunae - (1) dearth of accurate data and (2) lack of holistic approach. Four main factors connected to environmental change are climatic, tectonic, anthropogenic and biotic, and pollution. To overcome the problems faced in environmental

studies, the authors have suggested to create a national grid of research centres and data banks. This proposed grid also includes small museums and associated teacher-student communities that can serve as the main centres for people's participation in the environmental research and planning.

W-052: Wasson, R.J., S.N. Rajaguru, D.P. Agrawal, V.N. Misra, R.P. Dhir, A.K. Singhvi and K. Kameswara Rao 1983. Geomorphology, Late Quaternary Stratigraphy and Palaeoclimatology of the Thar Dunefield, *Zeitschrift fur Geomorphologie* (N.F.) 45: 117-151.

To understand the geomorphic evolution of the Thar Desert dune-fields, sand dune dynamics, their stratigraphy and palaeoenvironmental setting were studied. The factors involved in the development of dunes, like sediment sources, formative wind regime and distribution of various sand dune types such as poorly organised dunes, parabolic dunes, and linear dunes have been described. Maps of the study area were prepared using LANDSAT imagery and ground checks in southern and eastern parts of the desert. Archaeological and radiometric evidence from sand dunes at Langhnaj (Gujarat), Bagor, Tilwara, Amarpura, Budha Pushkar and Rang Mahal (Rajasthan) has been used. Also, data from Bahawalpur in Pakistan and other sites have been discussed. The dune sands were largely derived from local alluvial sources with a little contribution of the fine sand derived from the Arabian Sea coast. Combined evidence showed that the dunes were accumulating from at least 20,000 BP. The dunes got stabilised by the middle to the late Holocene. The Thar sand dunes were formed under the influence of summer monsoon winds. The continuation of the dune building activity from the Last Glacial Maximum (mean age 18,000 BP) into the Holocene has no parallels in other deserts of the world.

V-053: Misra, V.N. 1984. Climate as a Factor in the Rise and Fall of Harappan Civilisation: Evidence from Rajasthan and Beyond, in *Frontiers of the Indus Civilisation* (B.B. Lal and S.P. Gupta Eds.), pp. 461-489. New Delhi: Books and Books.

Based on archaeological data about fifty years ago it was proposed that the climate in Baluchistan and Sind during the Indus civilisation period was more wet than it is at present. Gurdip Singh used palynological evidence and proposed a different hypothesis. He suggested that the climate fluctuated throughout the Holocene. These fluctuations were related to emergence of agriculture, its expansion, and growth and decline of Harappan civilisation. This article is centred on three issues: re-examination of all available data (archaeological, palaeoenvironmental and hydrological) to test Gurdip Singh's hypothesis, the evidence for diffusion of Harappan settlements in and around Rajasthan, and possible gap between the Harappan culture and Painted Grey Ware culture. It is concluded that there is no data from northwest India to support Gurdip Singh's hypothesis that rainfall fluctuations played a decisive role in the origin, spread, growth and decline of the farming-based cultures in this region. Instead, it is the changes in the courses of the Drishadvati and Sutlej rivers and consequent drying up of the Saraswati river, along which Harappan settlements were mainly located, that played the most important role in the rise and fall of this Civilization.

V-054: Misra, V.N. 1985a. The Acheulian Succession at Bhimbetka, Central India, in *Recent Advances in Indo-Pacific Prehistory* (V.N. Misra and P. Bellwood Eds.), pp. 35-47. New Delhi: Oxford-IBH

Almost all the Palaeolithic cultural material is found in secondary geological contexts such as eroded river gravels and surfaces of rock outcrops. The tool collections are often random and without vertical references. In recent years (1972-1977) excavations were done in the rock-shelters at Bhimbetka (22° 50' N; 77° 37' E), a small hill in the Vindhyan range of Central India. Acheulian deposits were found in rock-shelters III F-23, III F-24, II A-29 and III A-30. Of these III F-23 provided a complete sequence of human occupation from late Acheulian to late Mesolithic periods. Thickness of the habitation deposit was 3.80 m and divisible into eight layers. A total of 32026 artefacts were examined of which 18721 belonged to the Acheulian culture of the Lower Palaeolithic, 8505 to the Middle Palaeolithic, 2522 to the Upper Palaeolithic, and 2278 to the Mesolithic period. Artefacts were classified into 66 classes according to the typology of Francois Bordes. Quantitative data for various artefact classes have been provided in tabular formats.

V-055: Misra, V.N. 1985b. Microlithic Industries of India, in *Recent Advances in Indo-Pacific*

Prehistory (V.N. Misra and P. Bellwood Eds.), pp. 111-122. New Delhi: Oxford-IBH.

Though microlithic technology originated from the Upper Palaeolithic industries of the terminal Pleistocene, its development and diffusion all over India took place only during the Holocene. Several well-preserved microlithic sites along with organic remains have been found. This article is based on 27 excavated microlithic sites. The aspects discussed comprise settlement pattern, geographic distribution of the sites and their demographic implications, technology, material culture and subsistence strategies, disposal of the dead, art and relative chronology of the microlithic industries. Most of the microlithic industries belong to a very developed stage and technological development can be seen at a very few sites. There is evidence for acculturation of the microlithic people through their contacts with more advanced communities.

G-056: Gaillard, C., V.N. Misra, S.N. Rajaguru, D.R. Raju and H. Raghavan 1985. Acheulian Occupation at Singi Talav in the Thar Desert: a Preliminary Report on the 1981 Excavation, *Bulletin of the Deccan College Post-Graduate & Research Institute* 44: 141-152.

The site of Singi Talav, located near Didwana in the Thar Desert of Rajasthan, was excavated in 1981. A trench of 4 x 4 m was dug up to 1.30 m depth. The trench yielded prehistoric industries at three levels, where the upper and the lower ones consisted mostly of rolled debris. The middle level contained fresh tools of diverse types. Of the five layers excavated, tools from layer 3 and 4 (50 cm thickness) were studied and pooled (n=148). Layers 3 to 5 probably correspond to the middle part of Amarpura Formation. The article describes various artefact types, their frequencies, raw material used, techniques of tool manufacture, weight and measurements. Both the horizontal and vertical distributions of the artefacts were studied. Most typical tools were handaxes. The small tools were side scrapers and front end scrapers. The assemblage consisting of a high proportion of retouched tools suggests that Singi Talav was a camp site besides being a workshop site. The assemblage points to an early stage of the Acheulian period.

V-057: Misra, V.N. 1986. Bhimbetka: Reflections of Life in Cave Art. *Science Age* 4(6): 17-26.

This article provides a glimpse of the prehistoric rock art site of Bhimbetka in Raisen district of Madhya Pradesh. The discussion about antiquity of rock art and a few world-famous rock art sites in Spain and France has been included. The author has summarised the results of excavations conducted in some rockshelters. He also has discussed hunting and gathering practices of present-day tribal communities such as the Gonds that live in the vicinity of the painted shelters.

V-058: Misra, V.N. and S.N. Rajaguru 1986. Environnement et Culture de l'Homme Prehistorique dans le Desert du Thar, Rajasthan, Inde. *L'Anthropologie* 90(3): 407-437.

The Thar Desert is a specific entity due to its geographic and geomorphological setting and climate (semi-arid to arid). The Quaternary studies carried out here are interesting from palaeoenvironmental point of view since humans have occupied this dry region from the Acheulian times. With help of detailed study of the region around Didwana (Rajasthan, India) it was possible to reconstruct the main features of the palaeoenvironment. The sand dunes were already forming when Lower Palaeolithic humans occupied that area. The inhabitants used available water and other resources. The people like today maintained a certain degree of equilibrium with their surrounding Nature and lived in the hard arid conditions of the past. This article summarises results of a long-term multi-disciplinary project involving field and laboratory studies related to palaeoenvironment, changing climatic conditions and human responses to these changes.

V-059: Misra, V.N. and M.L.K. Murty 1986. Cultural Adaptations in India during Terminal Pleistocene and Early Holocene Times, in *The Pleistocene Perspectives* Vol. 2, pp. 1-36. Southampton: World Archaeological Congress.

This review article presents the story of human adaptations during the terminal Pleistocene and the Early Holocene in India. The discussion includes the Upper Palaeolithic cultural material, the archaeological evidence of the Mesolithic phase and the variety of ecological niches occupied by humans during the Early Holocene.

H-060: Hema, R., D.R. Raju, S.N. Rajaguru, V.N. Misra and V.G. Parashar 1986. A Note on the Mineralogical Study of some Sand Dunes from the

Thar Desert, *Bulletin of the Deccan College Post-Graduate & Research Institute* 45: 35-46.

The problem of the age and origin of the Thar Desert is the background to this article. Two alternative theories about the origin of the sand dunes are discussed. These are (1) the origin from the Rann of Kutch advocated by scholars like D.N. Wadia (1961), and (2) the local sand source suggested by Wasson *et al.* (1983). Sand samples were collected from nine sites. The source of dune sand was determined using grain size diameter analysis, heavy mineral analysis and weathering index. The lithostratigraphy of the low dune site (2.5 m) of Langhnaj was compared to that of the high dune (15 m) site of Didwana. The results suggested that the Thar Desert sand has local origin. Based on low weathering index and persistence of unstable minerals it is postulated that the climate was essentially dry during the major part of the Late Pleistocene.

G-061: Gaillard, C., D.R. Raju, V.N. Misra and S.N. Rajaguru 1986. Handaxe Assemblages from the Didwana Region, Thar Desert, India: A Metrical Analysis, *Proceedings of the Prehistoric Society* 52: 189-214.

At Didwana in Nagaur district (Rajasthan) artefacts of the Lower Palaeolithic period have been recovered from several localities. Using Derek Roe's measurement scheme a total of 181 handaxes from 10 localities were statistically examined. The localities were Indola-ki-Dhani (n=8), Amarpura (n=4), Jankipura (n=17), Jayal (n=52), Koliya Hill (n=64), Koliya surface (n=10), Bandlav ki-Talav (n=21), and Surbi Talav (n=5). Handaxes from a few other sites were also included in the study making a total of 301 pieces. Besides the primary variables like length, width, thickness, L/B reatio and L/T ratio, various indices were computed and shape diagrams were made. Factor analysis and cluster diagrams were constructed to compare the handaxes. It was found that among the sites near Didwana Singi Talav seems to be the oldest where the handaxes are large, crude and with massive butts. Koliya Hill slope, Jayal and Jankipura form one group. These artefacts, generally occurring in the middle of the sequence perhaps represent the middle or the late phase of the Acheulian. From the boundary between the Amarpura and Didwana Formations at Bandlav ki-Talav the handaxes are smaller and better trimmed. These may be called as bifacial points rather than handaxes. The collections from sites near Didwana are more evolved than those from Chirki-Nevasa and Hunsgi.

V-062: Misra, V.N. 1987a. Evolution of the Landscape and Human Adaptation in the Thar Desert. Presidential Address, Anthropology and Archaeology Section of Indian Science Congress, Bangalore, *Proceedings of the 74th Indian Science Congress* Part II: 1-24.

This presidential address provides an in-depth review of palaeoenvironmental and prehistoric research conducted in the Thar Desert of Rajasthan. It introduces the present-day geographic and environmental setting of the arid region in Rajasthan and earlier researches in archaeology, palaeoclimate, Quaternary geology, geomorphology and related disciplines. The author brought to light evidence of prehistoric cultures (during 1961-1971) by extensive field studies. Evolution of the desert environment has been discussed along with the three major Quaternary geological formations (Jayal, Amarpura and Didwana). The address discusses the nature of human adaptations to the changing environment. Except during the hyper-arid Upper Pleistocene (c. 25000-13000 BP) surface water was always available in the Thar Desert. Just before the end of the Pleistocene around 13000 BP climate began to ameliorate. The Mesolithic hunter-gatherers perhaps appeared at this time, but they spread in the desert only during the mid-Holocene period (6000-4000 BP).

V-063: Misra, V.N. 1987b. Middle Pleistocene Adaptations in India, in *Pleistocene Old World: Regional Perspectives* (Olga Soffer Ed.), pp. 99-114. New York: Plenum Press.

Although research of the Lower Palaeolithic period began in the middle of the nineteenth century, more data have been generated during the last three decades. Several new projects have been carried out in the Son valley, Kashmir and the Thar Desert. Due to new information gathered from geological, sedimentological, palaeontological and archaeological studies, focus has now shifted from typological description to palaeoenvironment and human adaptations. The occurrence of the Middle Palaeolithic cultural phase is known from all over India except the Ganga Plain, very humid parts of the Western Ghats and north-east India. The cultural evidence of humans during this phase is

reviewed on a regional basis. The regions from which human adaptations are discussed include the Kashmir Valley, the Siwalik Hills, the semi-arid region of northwest India, northern part of Gujarat, Central India, the Deccan Plateau, and the southeastern coastal region.

V-064: Misra, V.N. and S.N. Rajaguru 1987. History of Environment and Man in the Thar Desert, *Indologica Jaipurensia* 1: 17-31.

The Thar Desert of Western Rajasthan has very scanty rainfall (100-500 mm per annum). For the proper use of present-day limited resources a knowledge of the past human-environment interaction is necessary. Extensive exploration was carried out, and several sites near Jayal and Didwana were excavated. The authors have addressed following questions: how and when did the desert come up, was the environment fluctuating or was it constant, how did humans adapt to desert conditions and have they played any role in the formation and expansion of the desert. The history of aridity as seen in the sand dune profiles has been corroborated by the study of sediments deposited in the salt lake at Didwana. Very harsh dry climate of the Thar Desert ended probably 7000 years ago.

V-065: Misra, V.N. 1988. Significance of Vertebrate Remains from Archaeological sites in the Arid and Semi-Arid Zones of Northwest India, in *Ecophysiology of Desert Vertebrates* (P.K. Ghosh and Ishwar Prakash Eds.), pp. 35-57. Jodhpur: Scientific Publishers.

Out of some 90 archaeological sites excavated in the arid and semi-arid zones of northwest India we have information about faunal remains from 28 sites. This article gives the details of the faunal remains and brings to notice the significance of faunal studies in archaeological interpretation. A total of 51 vertebrate species has been found from archaeological sites. There is a remarkable continuity in vertebrate fauna of the arid and semi-arid regions of India during the last ten thousand years or so.

V-066: Misra, V.N. and S.N. Rajaguru 1988. History of Environment and Man in the Thar Desert, *Journal of Ecological Society* 1: 7-16.

Most of the surface of the Thar Desert of Western Rajasthan is covered by sand dunes and sand sheets. In the extreme western part the rainfall is as low as 100 mm per year. Humans have occupied the desert since the early Acheulian period. The delicate balance between environment and humans established several thousand years ago is now being upset. The authors highlight the importance of knowing the environmental history of the desert. The results of multi-disciplinary investigations carried out in last five years have been summarised. Fifty prehistoric sites have been located on sand dunes and in fluvial sediments during intensive surveys. The occurrence of undisturbed Palaeolithic sites was found interesting. Excavations were carried out at Jayal and Didwana (Nagaur district, Rajasthan). Based on the results of archaeological and geomorphological studies the environmental history of the Thar desert and the human populations living there for last one million years or so has been traced.

V-067: Misra, V.N., S.N. Rajaguru and Hema Raghavan 1988. Late Middle Pleistocene Environment and Acheulian Culture around Didwana, Rajasthan, *Proceedings of the Indian National Science Academy* 54 A(3): 425-438.

As a part of multi-disciplinary research between 1980 and 1985 several Acheulian sites were investigated around Didwana in Nagaur district of Rajasthan. This work was focussed on exploration and excavation of the sites, mapping of Quaternary sediments, building of stratigraphic sequences, chemical and morphometric analysis, and dating of the archaeological horizons using various radiometric techniques. Three major Quaternary geological formations noticed (Jayal, Amarpura and Didwana) have been discussed. The sites are in primary context. The tool assemblages belong to the early stage of the Acheulian technology. The core tools are more and retouched tools are in low proportion. These finds based on lithostratigraphy and radiometric dating methods (C-14, U/Th and TL) have been dated to late Middle Pleistocene. The aeolian member of Didwana Formation revealed presence of acidic soils. In all the formations calcium carbonate occurs prolifically and gradual weakening of fluvial systems. All these features indicate that the climate during the Middle Pleistocene was semi-arid to arid.

H-068: Raghavan, Hema, S.N. Rajaguru and V.N. Misra 1989. Radiometric Dating of a Quaternary

Dune Section, Didwana, Rajasthan, *Man and Environment* 13: 19-22.

This article presents results of application of radiometric dating (C-14, U/Th and TL) techniques using pedogenic carbonates and quartz grains from a stabilized sand dune near Didwana in Nagaur district of Rajasthan. The Mesolithic tools occurred on the surface of lithounit I. Upper Palaeolithic tools were within lithounit II (5-6 m depth) and Middle Palaeolithic tools were distributed randomly between 9 and 13 m. Lower Palaeolithic artefacts were found at 17.20 m and 18.40 m within lithounit III. The date on pedogenic carbonates from the Upper Palaeolithic level was 26,210± 2200 (1700) BP. The TL age for the coarse fraction of the deposits from 17 to 18 m depths was 163,000± 21,000 BP. Three samples (from 12.65, 14.25 and 18.60 m depth) of pedognic carbonates were analysed using U/Th series method. It was concluded that the aeolian processes on the eastern margin of the Thar Desert are at least 200,000 years old.

V-069: Misra, V.N. 1989a. Stone Age India: An Ecological Perspective, *Man and Environment* 15(1): 17-64.

The author in this review paper begins with why ecological knowledge about early human societies is meagre. The emergence of humans in world context has been addressed in relation to the Lower Palaeolithic cultures in India - the Sohanian represented by pebble tools and the Acheulian represented by bifaces, pebble tools, scrapers, flakes, blades and cores. The Middle Palaeolithic occupation sites in Europe, Africa, Central Asia and Near East are associated with remains of Neanderthal humans. Stone tools of this period found in the Indian Subcontinent are similar to those found in Europe and other areas. The evidence concerning the environment during the terminal Pleistocene, Upper Palaeolithic societies and the human adaptations has been reassessed. The hunting-gathering communities of the early and middle Holocene are collectively assigned to the Mesolithic period. All evidence of these Mesolithic societies available so far has been critically re-examined.

V-070: Misra, V.N. 1989b. Mesolithic Cultures, in *Encyclopaedia of Indian Archaeology I: Subjects* (A. Ghosh Ed.), pp. 37-43. New Delhi: Munshiram Manoharlal.

The term Mesolithic in India denotes the cultural stage represented by microlithic industries not associated with ceramics and generally antedating farming -based rural cultures. This encyclopaedic entry describes both qualitative and quantitative information of this cultural stage. Though it is not possible to say whether technology was responsible, evidence points to phenomenal expansion of human population during this phase. The Mesolithic material culture has been described using information from various surface sites besides that from nine excavated sites: Bagor, Tilwara, Langhnaj, Lekhahia, Sarai Nahar Rai, Bhimbetka, Adamgarh, Birbhanpur, and Sangankallu. The points covered include stratigraphic context, chronology, environmental setting, stone tool assemblages, tool typology, biological remains, the method of disposing the dead and degree of sedentism.

V-071: Misra, V.N. 1989c. Banas Culture, in *Encyclopaedia of Indian Archaeology I: Subjects* (A. Ghosh Ed.), pp. 96-98. New Delhi: Munshiram Manoharlal.

This encyclopaedic entry provides a review of evidence of Chalcolithic culture on the Banas river in the Mewar region of Rajasthan. Nearly 50 sites of the Banas or Ahar culture are known of which two (Ahar and Gilund) have been excavated. The evidence in terms of settlement size, structural remains, ceramic assemblages, beads, and terracotta objects has been summarised. Relative chronology of Banas culture shows that it antedates the Malwa culture and postdates the Harappan culture.

V-072: Misra, V.N. 1989d. Desert, in *Encyclopaedia of Indian Archaeology I: Subjects* (A. Ghosh Ed.), pp. 197-201. New Delhi: Munshiram Manoharlal.

The desert or arid zone of India covers an area of 317090 km^2 of which 82% lies in Rajasthan and Gujarat. First significant archaeological discoveries in the desert began in the early 1940s. Explorations and excavations brought to light several prehistoric cultural phases. Critical examination of the data obtained from various disciplines has been used to outline a picture of the palaeoclimatic and archaeological history of the desert. This encyclopaedic entry notes that only a few secure C-14 dates are available. At the end of the Tertiary and the beginning of the Quaternary periods,

western part of Rajasthan had a drainage originating in the Himalayas as well as the Aravallis. Evidence for the aggradation (sediments up to 100 m thickness) has been found. Probably during the Middle Pleistocene the drainage started getting disorganised and by the Upper Pleistocene it became totally disfunctional. The Stone Age humans (Acheulian) appeared here before the drainage became completely extinct. By the end of the Acheulian or early Upper Pleistocene the desert became extremely arid and continued to be hyper-arid during the later part of the Upper Pleistocene. At the beginning of the Holocene climate became wet.

V-073: Misra, V.N. 1989e. Ecology and Settlement Pattern, in *Encyclopaedia of Indian Archaeology I: Subjects* (A. Ghosh Ed.), pp. 285-287. New Delhi: Munshiram Manoharlal.

Although data are far from adequate, some information about human settlements, nature of human adaptations and ecological conditions since the early Palaeolithic period of Stone Age is available. In this encyclopaedic entry the author has summarised the inferences about settlements at several sites all over India that include Maheshwar and Bhimbetka (Madhya Pradesh), Khyad (Karnataka), Kandivli (Maharashtra) and Sarai Nahar Rai (Uttar Pradesh), and Sojat, Bagor, Tilwara and Nagari (Rajasthan). An explanation for the expansion of human settlements into new regions and more intensive exploitation of known ecological zones has been provided.

V-074: Misra, V.N. 1989f. Bagor, in *Encyclopaedia of Indian Archaeology II: A Gazetteer of Explored and Excavated Sites* (A. Ghosh Ed.), pp. 34-37. New Delhi: Munshiram Manoharlal.

This encyclopaedic entry covers the findings of investigations carried out at the prehistoric site of Bagor in Rajasthan. Bagor (district Bhilwara) is located on the left bank of river Kothari, a tributary of river Banas. Excavation was conducted on the Mahasati dune (200 x 150 m and height 6 m) where 20 x 10 m area was dug. The total thickness of the deposit was 1.5 m in which occupation of two phases was found. Phase I has been placed between 5000 and 2500 BC and Phase II belonged to 500 BC to AD 200.

V-075: Misra, V.N. 1989g. Bhimbetka, in *Encyclopaedia of Indian Archaeology II: A Gazetteer of Explored and Excavated Sites* (A. Ghosh Ed.), pp. 69-73. New Delhi: Munshiram Manoharlal.

This encyclopaedic entry provides information about archaeological investigations carried out at Bhimbetka rock-shelter complex (Raisen district, Madhya Pradesh). The site was discovered by V.S. Wakankar in 1957 and was excavated on a limited scale by K.D. Bajpai and S.K. Pandey in 1971. This entry covers findings of excavation carried out by V.N. Misra and V.S. Wakankar between 1974-75. The discussion includes basic information about the Bhimbetka hills, types of rock-shelters, stratigraphy of excavated trenches, cultural sequence, tool assemblages and paintings.

V-076: Misra, V.N. 1989h. Human Adaptations to the Changing Landscape of the Indian Arid Zone During the Quaternary Period, in *Old Problems and New Perspectives in the Archaeology of South Asia* (J.M. Kenoyer Ed.), II: 3-20. Wisconsin Archaeological Reports. Madison: University of Wisconsin-Madison.

The palaeoenvironmental history and archaeological records of the Indian arid and semi-arid zone have been reviewed. The review showed that present-day climate, hydrology and landscape are different from those in the Late Tertiary and Early Quaternary periods. Many changes occurred in this long period such as weakening and eventual extinction of Himalayan rivers, tectonic uplifting of gravel beds of the Jayal Formation in Rajasthan, filling of basins by alluvial sediments, capping of alluvial plains by aeolian deposits and increase in aridity. The desert zone was extensively occupied by human populations during the Lower and Middle Palaeolithic periods. During the terminal Pleistocene the region experienced extreme aridity. Because of shrinkage of resources, human occupation became sparse during the Upper Palaeolithic period. The climate was markedly humid during the mid-Holocene. The Mesolithic hunter-gatherers responded dynamically to the changed climate and spread in the desert. By 2000 BC arid condition like those of today came into existence. Absence of streams over many parts of the region inhibited introduction of agriculture until about two thousand years ago. But availability of pastures in rest of the desert favoured pastoralism. However, the ancient pattern of hunting and

gathering continued and is sill surviving to some extent.

V-077: Misra, V.N. 1989i. Van Vagris: Nomadic Hunters of Western Rajasthan, in *Changing Perspectives of Anthropology in India* (S.C. Tiwari Ed.), pp. 285-311. New Delhi: Today and Tomorrow's.

Van Vagris (Van Vavris or Van Vaoris) are a semi-nomadic hunting people found in the semi-arid region of western Rajasthan. Nothing is known about these people from published sources. There are two other communities in Rajasthan - Bagris and Baoris with names similar to that of the an Vagris. However, the Van Vagris are totally different from both of them. They live almost entirely by hunting-gathering, and unlike many other hunter-gatherers, do not indulge in crime. This article summarises results of fieldwork conducted between 1979 and 1985 to gain an understanding of the culture of this community. The author has described the community's habitat, demography, settlement pattern, physical appearance, dress, ornaments, social organisation, marriage customs, subsistence activities, hunting technology, religion and relations with other communities.

V-078: Misra, V.N. and Yashodhar Mathpal 1989. Rock Art, in *Encyclopaedia of Indian Archaeology I: Subjects* (A. Ghosh Ed.), pp. 279-284. New Delhi: Munshiram Manoharlal.

A.C.L. Carlleyle was the first in India to discover (in 1867-68) paintings on the walls and ceilings of rock-shelters, and to assign prehistoric antiquity to them. At present 150 rock-art sites (grouped into 19 areas) are known of which a majority are situated in the hilly regions. This essay provides a summary of research findings about rock art in India. The topics addressed by the authors are geographic locations, state of preservation, colour and style, superimposition, relative chronology, contents, motives behind the paintings and significance of these studies in Indian prehistoric context.

V-079: Misra, V.N. and Malti Nagar 1989. Hunter-gatherers in an Agrarian Setting: The Nineteenth Century Situation in the Ganga Plains, *Man and Environment* 13: 17-64.

Hunter-gatherer communities are living in the Ganga Plains since the Mesolithic period for several thousands of years. Till the beginning of the British rule human groups living a traditionally pre-agricultural way of life had relative freedom. During the general law and order decline situation at the end of the Mughal rule some of these communities turned to crime. In the densely populated alluvial Ganga Plains the aboriginal people doing hunting-foraging are expected to be complexly assimilated in the new social order that emerged after settled life. But the picture in the upper and middle Ganga Valley shows that it is not always the case. In this article the authors have studied several hunter-gatherer peoples such as the Baheliyas, Bangalis, Kanjars, Badhiks, Bawariyas, Bhantus, Haburas, Sansiyas, and Beriyas. Using historical sources and field observations various social-cultural aspects of these communities were investigated. These include settlement pattern, population distribution, occupational history, subsistence, technology of hunting, crime, attitude of the government agencies and interaction with the larger society. The process of assimilation of these continuously moving populations into the caste system has been traced. Some sections of these communities were assimilated into the hierarchical caste system and were assigned a social rank according to the services they provided However, the acculturation of these people is a continuous and ongoing process.

V-080: Misra, V.N. and Suman Pandya 1989. Mesolithic Occupation around Dhansura, District Sabarkantha, Gujarat, *Man and Environment* 14(1): 123-128.

The alluvial plain of northeastern Gujarat is known for rich concentration of Mesolithic sites. Three new sites were discovered near the town of Dhansura (13° 20' 50" N; 73° 15' 10") in the Sabarkantha district. The evidence of the Mesolithic occupation was found buried in sand dunes at three localities and got exposed due to quarrying activity. This article presents a preliminary report about location, stratigraphy and archaeological material found at these localities (Dhansura I-III). The stone artefact assemblages at the three localities are homogeneous with respect to their stratigraphic context, raw material, typology, state of preservation and technique of manufacture.

V-081: Misra, V.N. and S.N. Rajaguru 1989. Palaeoenvironment and Prehistory of the Thar Desert, Rajasthan, India, in *South Asian Archaeology 1985* (Karen Frifelt and Per Sorensen Eds.), pp. 296-320. Copenhagen: Scandinavian Institute of Asian Studies.

The earliest record of human presence in the Thar Desert consists of the early Acheulian assemblages found near Didwana (Rajasthan). As a part of the project to understand the prehistoric settlements and the environment, several field and laboratory studies were undertaken. These include intensive surveys, recording stratigraphy of lake sediments, study of geological Formations such as Jayal, Amarpura, and Didwana, systematic excavations at Jayal and three other localities near Didwana, and various radiometric dating studies. With the help of these multi-disciplinary investigations the authors have attempted to reconstruct the environment during the Late Neogene and Quaternary periods, and human responses to changing environmental conditions in arid and semi-arid regions of Rajasthan. The Late Upper Pleistocene was the period of maximum aridity. After c. 25,000 BP conditions became hyper-arid and there is no evidence of human occupation in the desert. Just before 13000 BP climate began to change and there is evidence for a climate regime of rapidly fluctuating rainfall. Even though Mesolithic hunter-gatherers appeared at this time, their major spread into the desert took place in the mid-Holocene period (6000-4000 BP).

D-082: d' Errico, Francesco, Claire Gaillard, and V.N. Misra 1989. Collection of Non-Utilitarian Objects by *Homo erectus* in India, in *Hominidae: Proceedings of the Second International Congress of Human Palaeontology* (Giacomo Giacobini Ed.), pp. 237-239. Milan: Jaca Books.

At the Acheulian site of Singi Talav near Didwana in the Thar Desert of Rajasthan, six quartz crystals were found as a part of a Lower Palaeolithic lithic industry. Singi Talav is an open-air site. The quartz crystals were found from the main occupation level at the base of layer 4. The edges of the crystals were examined using Scanning Electron Microscopy (SEM). It revealed that except one other crystals do not show any use-wear mark. Though these were brought into the site by *Homo erectus* these were considered as non-utilitarian objects. It was difficult to explain the occurrence of such non-utilitarian objects in the site. Perhaps they were brought because of their attractive appearance.

G-083: Gaillard, C, V.N. Misra and M.L.K. Murty 1990. Comparative Study of Three Series of Handaxes - One from Rajasthan and Two from Andhra Pradesh, *Bulletin of the Deccan College Post-Graduate & Research Institute* 49: 137-144.

The article provides a comparative metrical analysis of three series of handaxes made by the authors. These series are collection of handaxes from Singi Talav near Didwana in Rajasthan (n=126), and Guravarajupalli (n=34) and Vedullacheruvu (n=46) from Andhra Pradesh. The collections included various types such as backed, unifacial, pick handaxe and proto-handaxe. The parameters used for comparison were the number, length, thickness, angle and profile of flake scars. The bifacial index calculated from number of flake scars on faces A and B was used for comparison. Similarly various shape indices were computed. The statistical analysis indicated that Vedullacheruvu large cutting tools were more evolved. These tools had small size, more regularity of outline and better standardisation of volume. On the other hand, the Singi Talav tools are larger, more elongated and often roughly trimmed.

V-084: Misra, V.N. 1990a. Palaeolithic Phase in India, *Ancient Ceylon* 7(2): 101-149.

This article provides culture-wise review of prehistoric research conducted in India since the 1930s. The sections are arranged under following headings: the emergence of man, Lower Palaeolithic (Sohanian and Acheulian culture), Middle Palaeolithic, Upper Palaeolithic, and environment and cultural development during the terminal Pleistocene. Summary of the Late Pleistocene fossil fauna and radiometric dates from Palaeolithic sites have been given in the form of appendices.

V-085: Misra, V.N. 1990b. Prehistoric Cultural Stages in the Middle Son Valley, *The Indian Historical Review* 14(1-2): 252-262.

This article is based on the results of investigations carried out during 1980-81 expedition in the Son valley (Sidhi district, Madhya Pradesh). The multi-disciplinary research project headed by G.R. Sharma and J.D. Clark was aimed to trace the

history of earliest human occupation and the palaeoenvironment in the valley. The summary of archaeological and palaeoenvironmental findings, chronology and geomorphology of the study area have been provided in this review.

V-086: Misra, V.N. 1990c. The Van Vagris - "Lost" Hunters of the Thar Desert, Rajasthan, *Man and Environment* 15(2): 89-108.

Van Vagris (Van Vavris or Van Vaoris) are a semi-nomadic hunting community found in the semi-arid region of western Rajasthan. There is no mention of these people in census reports, gazetteers or anthropological writings. Since no census data are available. There existed some doubt whether the Van Vagris have a separate ethnic identity. It is possible that the Van Vagris, Jangaliyas, Aheris, Bawarias and others are descendent of Mesolithic hunting-gathering communities whose cultural remains have been found in Rajasthan and adjoining areas. The author conducted fieldwork between 1979 and 1985 to gain an understanding of this community. He has described their habitat, demography, settlement pattern, physical appearance, dance, ornaments, temperament and character, social organisation, marriage, subsistence, religion, and their relations with other communities. In the area of Didwana the Van Vagri society is divided into 13 exogamous clans. Meat of wild animals and birds forms the principal component of their daily diet. They use various kinds of nets and traps to catch the animals. Their religion is centred around mother goddess worship that is represented by a metal image. These people generally keep away from permanent settlements and have very limited interaction with other communities.

N-087: Nagar, Malti and V.N. Misra 1990. The Kanjars - A Hunting-Gathering Community of the Ganga Valley, Uttar Pradesh, *Man and Environment* 15(2): 71-88.

It is a popular impression that the hunting-gathering communities in India are mainly confined to hilly and forested tracts. Yet the hunter-gatherers have continued their way of life and retained their cultural identities for a long time in the large alluvial plains. The Kanjars are one of the largest and most widely distributed hunting-gathering communities in India. The information provided in this article is derived from published sources and field observations made on Kanjar groups living in Farrukhabad district of Uttar Pradesh. This article describes mainly the ethnographic and demographic features of the Kanjars such as their history, group size, settlement patterns, occupations, subsistence, technology of hunting, crime, disposal of the dead, and religious beliefs. The Kanjars like other nomadic communities have been changing in recent years and their acculturation is taking place. The information about such communities is significant because it provides clues to interpreting archaeological data from several Mesolithic sites in Uttar Pradesh which have been excavated in recent years. Also, the process of assimilation of the Kanjars in the larger sedentary society is important from social historical perspective.

V-088: Misra, V.N., S.N. Rajaguru, R.K. Ganjoo and R. Korisettar 1990a. Geoarchaeology of the Palaeolithic Site at Samnapur in the Central Narmada Valley, *Man and Environment* 15(1): 107-116.

For locating Palaeolithic sites in the fine-grained deposits of the Central Narmada Valley, a research project began in 1986. Initially the area around Devakachar village in Narsinghpur district was investigated. Later focus shifted to the Vindhyan foothills on the northern side of river Narmada after the site of Samnapur (23° 06' 17" N; 79° 07' 30" E) was discovered by S.B. Ota and L.K. Mishra. The site is located on the high (23 m) alluvial terrace of the Narmada. The archaeological horizon occurs in the form of a rubble spread (100 x 60 m) and the stone artefacts were exposed due to erosion of the overlying silt. The artefact assemblage associated with the rubble represents a semi-primary context. During three field seasons (1987-1990) an area 44 m^2 was dug. A total of 3192 artefacts and a small number of fossilised bone fragments were recovered. Preliminary examination of the artefacts revealed that flakes (5-20 cm) predominate. Most of the artefacts were made from locally available cherty quartzite and looked in fresh condition. On typological grounds the Samnapur tool assemblage has been classified as Middle Palaeolithic.

V-089: Misra, V.N., S.N. Rajaguru, R.K. Ganjoo and R. Korisettar 1990b. Further Research in the Prehistory and Quaternary Geology of the Narmada Valley, in *Adaptation and Other Essays* (N.C. Ghosh and S. Chakrabarti Eds.), pp. 53-59. Santiniketan: Visva-Bharati.

As a part of a multi-disciplinary research project, the site of Samnapur (23° 06' 17" N; 79° 07' 30" E) was excavated during 1987-1990. This paper describes the preliminary results of the 1988 excavation season. A total area of $31m^2$ was excavated and digging was done up to a depth of 35 cm. The density of artefacts was found to increase with depth. The artefacts (n=676) looked remarkably fresh. These comprised shaped tools (26.18%), modified tools (1.92%) and debitage (71.89%). The scrapers dominate (94.35%) among the shaped tools that are all made on flakes. The retouch is bold, mostly unifacial and restricted to the edges. The paper contains information about geological setting, fossils, palaeoenvironmental inferences, stratigraphy, and suggestions about site formation. The assemblage appears to be a variant of the Middle Palaeolithic adapted to forest ecology.

V-090: Misra, V.N. 1992a. Archaeology and Tribes, in *Thar Desert in Rajasthan: Land, Man and Environment* (A.K. Singhvi and Amal Kar Eds.) pp. 85-94. Bangalore: Geological Society of India.

The pattern of human adaptations in the Thar Desert of Rajasthan is closely linked to the recurrent changes in climate, hydrology and landforms in this region. This article provides an overview of findings of the multi-disciplinary researches in the Thar desert over last three decades. The earliest record of human colonisation begins with the Acheulian culture. Human societies in the desert show a variety of adaptive strategies to a harsh environment where scarcity of water is the major factor affecting development and socio-economic structures.

V-091: Misra, V.N. 1992b. Research on the Indus Civilization: A Brief Review, *The Eastern Anthropologist* 45(1-2): 1-19.

The Harappan or Indus civilisation was discovered in the early twenties of the twentieth century. R.D. Banreji and Daya Ram Sahani contributed to the early archaeological studies. Since then, knowledge of this civilisation has grown enormously. This article provides a brief review of the exploration findings, excavations and general research conducted at the Harappan sites. The points reviewed include geographical distribution, settlement pattern, spatial and temporal variation, economy, external trade and contacts, human remains, religion, script, social and political organisation and chronology. Various theories about decline and disappearance of the civilisation based on foreign invasions, tectonics, climate change, environmental deterioration, and hydrological change have been reviewed.

A-092: Alam, M.S. and V.N. Misra 1992. Quantitative Composition and Functional Aspect of the Palaeolithic Assemblages of Rock Shelter IIIF-23 at Bhimbetka. *Man and Environment* 17(2): 21-34.

This paper is based on quantitative analysis of artefacts collected (n=11536) from trenches E and F of rock-shelter III F-23 at Bhimbetka (22° 50' N; 77° 37' E) excavated by V. N. Misra during 1973-75. Variables analysed include length, breadth, retouch angle and weight of the artefacts. Chi-square test and two sample tests such as Mann-Whitney U test and `t' test were used to compare different cultural periods and layers, This study was aimed to assess temporal variation in Palaeolithic assemblages recovered from primary context. Artefact classes were found to be consistent except handaxes and cleavers. Heavier, broader and larger artefacts are more common in layer seven of the Lower Palaeolithic period. Lighter, narrower and smaller artefacts dominate all classes except handaxes and cleavers. The handaxes and cleavers are medium in size. Borers are heavier, broader and larger in the Upper Palaeolithic period than the earlier periods.

N-093: Nagar, Malti and V.N. Misra 1993. The Pardhis: A Hunting-Gathering Community of Central and Western India, *Man and Environment* 18(1): 115-140.

This article provides a brief account of the culture and lifestyle of the Pardhis, a hunting-gathering community found in central and western India. The information given here was gathered during the 1989-90 field season from Pardhis of Narsinghpur and Sagar districts of Madhya Pradesh. Also, data from published works have been used to supplement the ethnographic record. During the British period the Pardhis were included in the list of Criminal Tribes. Like many other hunting-gathering communities, Pardhis too are engaged in criminal activities as an alternate source of livelihood. Therefore, the author faced several difficulties in establishing contacts and collecting personal information. The authors have described

the lifestyle, distribution, population, settlement patterns, social organisation, economy, dress and appearance, family and marriage system, and disposal of the dead of the community. The Pardhis are extremely poor and possess very little property. Their main occupation is hunting and they use a variety of techniques to trap and kill animals.

V-094: Misra, V.N., V.S. Shinde, R.K. Mohanty and Lalit Pandey 1993. Terracotta Bull Figurines from Marmi: A Chalcolithic Settlement in Chitorgarh District, Rajasthan, *Man and Environment* 18(2): 149-152.

During 1993 field season a systematic survey of the Banas and Berach rivers in Rajasthan was carried out to find out an Ahar culture site suitable for excavation. The site of Marmi (25° 06' N; 74° 25') located on the Banas river in Chitorgarh district and locally known as Purani (old) Marmi was one of the several known sites which were examined. Surface finds included a variety of ceramics, terracotta bull figurines and beads of shells and terracotta. The ceramic assemblage showed that the site was occupied from the Chalcolithic period up to the Medieval period. This article describes 58 terracotta bull figurines collected during the exploration. The bull figurines were perhaps votive objects.

V-095: Misra, V.N. 1994a. Patterns of Human Adaptation in the Semi-arid and Arid Zone of Rajasthan, in *Living Traditions: Studies in the Ethnoarchaeology of South Asia* (Bridget Allchin Ed.), pp. 101-124. New Delhi: Oxford and IBH.

This brief ethnographic account of the human population found in Rajasthan shows how people adapt to ecological conditions. The communities develop a variety of cultural and economic adaptations to suit the harsh environment around them. The strategies adopted by the desert communities have been exemplified giving ethnographic observations on communities such as the Banjaras, Bishnois, Van Vagris, Raikas, Thoris, and Bhils.

V-096: Misra, V.N. 1994b. Indus Civilization and the Rigvedic Sarasvati, in *South Asian Archaeology 1993* Vol. II (Asko Parpola and Petteri Koskikallio Eds.), pp. 511-525. Helsinki: Suomalainen Tiedeakatemia.

The Harappan or Indus civilisation was discovered in the 1920s. Our knowledge of this civilisation has grown after 1950s due to discoveries and excavations of many Harappan sites. Also, new methodologies and focussed researches, especially on the environmental setting, have contributed to a much better understanding about the origin, growth and decline of this major civilisation of ancient South Asia. This paper discusses the distribution pattern of the Harappan civilisation in the Greater Indus Valley (M.R. Mughal's term). It provides statistical summary of the discovered sites, maps showing geographic distribution pattern, significance of the Ghaggar-Hakra river and it being the Rigvedic Sarasvati, and the process of the shifting of the courses of Sutlej and Yamuna. Less than 50 sites are located on the Indus river as opposed to nearly one thousand sites on the Ghaggar-Hakra river. This analysis showed that the Indus civilisation was centred on the Ghaggar-Hakra river and not on the Indus river. Based on multidisciplinary evidence it is concluded that Ghaggar-Hakra river represents the remnant of Vedic Sarasvati, the lifeline of the Indus civilisation.

N-97: Nagar, Malti and V.N. Misra 1994. Survival of the Hunting-gathering Tradition in the Ganga Plains and Central India, in *Living Traditions: Studies in the Ethnoarchaeology of South Asia* (Bridget Allchin Ed.), pp. 169-192. New Delhi: Oxford and IBH.

The antiquity of hunting-gathering way of life in India goes back to the Middle Pleistocene and possibly even earlier. These communities started changing with the spread of agriculture during the fourth millennium BC They continued their way of life and retained their cultural identities for a long time in the large alluvial plains. This paper gives a brief ethnographic account of hunting-gathering communities in the Ganga Plain and in Central India. The information about Kanjars and other people such as the Baheliyas, Bangalis, Badhiks, Bawariyas, Bhantus, Haburas, Sansiyas, and Beriyas has been collected from published accounts, and that about the Kanjars, Pardhis and Kuchbandhiyas from fieldwork. The demographic features of these people, their history, group size, settlement patterns, occupations, subsistence, technology of hunting, crime, disposal of the dead, and religious beliefs have been described.

V-98: Misra, V.N. 1995a. Evolution of

Environment and Culture in the Rajasthan Desert during the Late Quaternary, in *Ancient Peoples and Landscapes* (Eileen Johnson Ed.), pp. 77-103. Lubbock, Texas: Texas Tech University Press.

Multi-disciplinary research in Rajasthan during the last two decades has added substantially to the knowledge of the evolution of the desert environment and human adaptations to it during the later part of Quaternary. The research included mapping of Quaternary formations, radiometric dating of sedimentary units, exploring and excavating archaeological sites, analysis of cultural material and collecting ethnographic information. This paper traces the changes that occurred in human culture and the evolution of desert environment from the Lower Palaeolithic times up to 2000 years ago.

V-99: Misra, V.N. 1995b. Geoarchaeology of the Thar Desert, Northwest India, in *Quaternary Environments and Geoarchaeology of India: Essays in Honour of Professor S.N. Rajaguru* (S. Wadia, R. Korisettar and V.S. Kale Eds.), pp. 210-230. Bangalore: Geological Society of India.

This article summarises results of a decade of research on palaeoenvironment and geoarchaeology of the Thar Desert in northwest India. The research showed that the present landscape, climate and hydrological setting of the arid and the semi-arid region are markedly different from what they were during the Neogene and Early Quaternary. Multi-disciplinary investigation demonstrated that the powerful and well-integrated drainage system operating in the past steadily declined and eventually disappeared. From the Middle to the Late Pleistocene there was extensive human occupation of the Desert. The climate was humid during the Mid-Holocene. The Mesolithic hunter-gatherers who were present before spread in the desert during the mid-Holocene period. By the Late Holocene the arid conditions similar to those of the present-day began to set in.

V-100: Misra, V.N. 1995c. Indus Civilization and the Rigvedic Sarasvati, *Second International Congress Proceedings*, pp. 125-142. Mumbai: H.R. Cama Oriental Institute.

The distribution pattern of the Indus or Harappan civilisation sites showed that it was centred on the Ghaggar-Hakra river and not on the Indus river from which it derives its name. Less than 50 sites are located on the Indus river whereas about 1000 sites are located on the Ghaggar-Hakra river. To be able to support the vast population represented by the large number of Harappan sites, the Ghaggar-Hakra river had to carry water perennially in its large and wide bed. The cumulative mufti-disciplinary evidence (geomorphic, sedimentological, remote sensing, archaeological, historical and folkloristic) supports the hypothesis that the present Ghaggar-Hakra river represents the remnant of Vedic Sarasvati, the lifeline of the Indus civilisation.

V-101: Misra, V.N., Vasant Shinde, R.K. Mohanty, Kurush Dalal, Anup Mishra, Lalit Pandey and Jeevan Kharakwal 1995. Excavations at Balathal: Their Contribution to the Chalcolithic and Iron Age Cultures of Mewar, Rajasthan, *Man and Environment* 20(1): 57-80.

Nearly 90 Chalcolithic sites were discovered during forty years of research in the Mewar region of Rajasthan. Balathal (24° 43 N; 73° 59 E) is located in the Udaipur district. This article describes results of the excavations at the site during 1994-95 and the major findings that include ceramics, beads, copper and iron objects, structures, terracotta objects, glass bangles, and a ring well. The excavation yielded evidence of two cultural periods: the Chalcolithic period (layer 14 to 22) and the Iron Age (layers 1-12). The Chalcolithic period at Balathal (2350-1800 BC) is characterised by the presence of large rectangular and squarish structures that served varied functions. In the Iron Age context (5th century BC-3rd century AD) a mud rampart of rectangular shape (30 x 15 m) was found. The rampart has a stone revetment. A number of iron smelting furnaces and several iron implements were found. These show that Balathal played an important role in the social organisation of Rajasthan during the Iron Age.

V-102: Misra V.N. 1996. Mesolithic India: History and Current Status, in *The Prehistory of Asia and Oceania* (G.E. Afanasev, S. Cleuziou, J.R. Lukacs and M. Tosi Eds.), pp. 321-328. ABACO Edizioni.

This brief review provides discussion about salient features of the Mesolithic Age in India such as the history of research, position of the Mesolithic phase in Indian prehistory, geographical distribution of the Mesolithic sites in India,

settlement pattern, technology, subsistence pattern, dwellings, disposal of the dead, material culture, Mesolithic art, technological development, cultural evolution, and chronology.

V-103: Misra, V.N. and S.N. Rajaguru 1996. Palaeoenvironment and Prehistory of the Thar Desert, Rajasthan, India, in *Facets of a Marwar Historian: Aspects of India's Social and Economic History* (B.L. Bhadani and Dwijendra Tripathi Eds.), pp. 99-133. Jaipur: Publication Scheme.

Since 1987 a team of scientists and archaeologists has been investigating near Didwana (Nagaur district, Rajasthan) to understand the geological record of palaeoenvironment, and archaeological record of human habitation in the Thar Desert. This article presents a synthesis of results obtained till 1985. It contains a description of systematic excavations carried out at Jayal, Singi Talav, Indola ki Dhani and 16R, environment during the Late Neogene and Quaternary, Geological Formations and human response to changing environment.

V-104: Misra, V.N. 1997a. Early Man and His Environment in Central India, *Journal of the Palaeontological Society of India* 42: 1-18.

This review traces the history of humans in Central India from the earliest times to the beginning of the copper-using phase. Central India is an area of special culture-historical interest since three of the Subcontinent's cultural streams are found here. The article provides information about the geographic and environmental setting, the diversity of people and history of prehistoric research conducted in this region from the mid-nineteenth century. The author has reviewed palaeontological, cultural and other material evidence related to the prehistoric man from the earliest hunter-gathering stage (the Lower Palaeolithic) to the beginning of settled village life stage (the Chalcolithic). The Lower Palaeolithic evidence from the Narmada, Belan, and Son valleys is discussed. The human cultural attributes during the Middle and Upper Palaeolithic, and Mesolithic periods are thoroughly reviewed. Except during the Upper Palaeolithic phase the region was intensively inhabited. The environment during the Holocene seems to have been conducive as there was a rapid increase in human population and sedentism during the Mesolithic phase. About 4500 years ago agriculture began in Central India. The material remains after emergence of agriculture and settled life are discussed in detail.

V-105: Misra, V.N. 1997b. Balathal: A Chalcolithic Settlement in Mewar, Rajasthan, India: Results of First Three Seasons Excavations, *South Asian Studies* 13: 251-273.

This paper describes the results of three season's excavations (1994-1997) conducted at Balathal (24° 43 N; 73° 59 E) in Udaipur district, Rajasthan. Digging has been done in an area of 1400 m^2 in nearly sixty trenches. Twenty-two layers were identified in trench F4. The deposit of the upper 12 layers consisted of highly burnt and vitrified ash. Layers 6 to 13 found in trench F4 were absent in other trenches. The habitation of the site rests on a thin layer of black soil that was formed over the natural granite and gneissic bedrock. The article deals only with the structures, ceramics, subsistence economy and chronology of the Chalcolithic period (2500-1600 BC).

V-106: Misra, V.N., V. Shinde, R.K. Mohanty, Lalit Pandey and Jeevan Kharakwal 1997. Excavations at Balathal, District Udaipur, Rajasthan (1995-97), with Special Reference to Chalcolithic Architecture, *Man and Environment* 22(2): 35-59.

This paper describes major findings of further excavations conducted at Balathal (24° 43 N; 73° 59 E) between 1995 and 1997. Though information about pottery, other material objects and stratigraphy has been given, the main focus of this paper is to provide a detailed description of the Chalcolithic architecture. The Chalcolithic period at Balathal (2800-1500 BC) is characterised by the presence of three residential complexes divided by a wide street and a narrow lane. The houses are made of stone and mud brick. A total of 15 radiocarbon dates were obtained. These range from 1820±70 to 5770±100 BP (based on half-life of 5730 years). Based on in-depth examination of the ceramics, the origin and development of the Chalcolithic culture at Balathal has been traced.

V-107: Misra, V.N., S.N. Rajaguru, R.J. Wasson, G. Singh and D.P. Agrawal 1997. Further Light on Lower Palaeolithic Occupation and Palaeoenvironment in Semi-Arid Zone of Rajasthan, in *Indian Prehistory 1980* (V.D. Misra and J.N. Pal Eds.), pp. 51-60. Allahabad: University of Allahabad.

An exceptionally rich Lower Palaeolithic site near Jayal (27° 13' N; 74° 11' E) in Nagaur district of Rajasthan was discovered in 1979. This article provides description of various trenches at Didwana, Singi Talav, Amarpura quarries, and Indola ki Dhani. The flaked artefacts (n=130) contained handaxes, scrapers and choppers as well as debitage. All the artefacts were fresh in condition. Metrical analysis and quantitative information about the artefacts are provided.

V-108: Misra, V.N. and Malti Nagar 1997. From Tribe to Caste: An Ethnoarchaeological Perspective, in *From Tribe to Caste* (Dev Nathan Ed.), pp. 136-166. Shimla: Indian Institute of Advanced Study.

This article provides an outline of the process of incorporation of tribal societies into the caste society with help of archaeological and ethnographic data. It furnishes definitions of caste and tribe, distinctive features of caste system and the tribal societies, the tribe-caste continuum and the process of transition from tribe to caste, Stone Age human population expansions, origin and spread of agriculture and its intensification during the Iron Age. Against this archaeological background the authors trace the origin of caste system, factors contributing to the incorporation of tribal people into the caste society and the process of assimilation. The Kanjars, a hunting-gathering community of north Indian plains has been taken to illustrate the point about the tribe-caste interaction.

N-109: Nagar, Malti and V.N. Misra 1998. Hunter-Gatherers in Ganga Plains, in *Perspectives in Tribal Development: Focus on Uttar Pradesh* (H.S. Saksena, B.R.K. Shukla, P.K. Tewari and P.N. Sharma Eds.), pp. 141-147. Lucknow: Ethnographic and Folk Culture Society.

India has a tribal population of over 40 million. More than 300 distinct communities have been classified as Scheduled Tribes for favoured treatment by the government. It is expected that the original hunting-gathering communities would have completely assimilated into the new socio-cultural order. But this is not true everywhere. Many communities found in the upper and middle Ganga Valley show that these have continued their way of life and retained their cultural identities for a long time. The communities included in this study are Aheriyas, Baheliyas, Kanjars, Bangalis, Bandis, Gandhilas, Bawariyas, Bhantus and Badhiks.

V-110: Misra, V.N. 1999. Pottery, in *Chemistry and Chemical Techniques in India* (B.V. Subbarayappa Ed.), pp. 223-244. New Delhi: Centre for Studies in Civilizations.

Pottery appears in the archaeological record only after the emergence of agriculture and settled life during the Neolithic period. This chapter on pottery provides a compact introduction to various ceramic forms found from the Neolithic culture sites up to the Early Historic sites. The discussion is related to the manufacturing techniques, Neolithic pottery from various parts of India, the early, mature and late Harappan pottery, Chalcolithic pottery (Malwa and Jorwe culture), Painted Grey Ware, Northern Black Polished Ware, Rouletted Ware and Arretine Ware.

V-111: Misra, V.N. 2001a. Archaeological Evidence of Early Modern Human Occupation in South Asia, in *Humanity from African Naissance to Coming Millennia* (P.V. Tobias, M.A. Raath, J. Moggi-Cecchi and G.A. Doyle Eds.), pp. 223-230. Firenze: Ferenze.

Significant archaeological evidence for colonisation of South Asia starts appearing from the Acheulian stage of the Lower Palaeolithic, which may date to *c.* 700,000 years ago. Two phases of the Acheulian culture can be recognised - an earlier one characterised by high proportion of core tools, low proportion of crudely made cleavers and flake tools and absence of Levallois technique. The later phase is marked by low proportion of bifaces, use of large flakes, a high ratio of cleavers to handaxes and very high proportion of flake tools like scrapers. This paper summarises the evidence of human occupation during the subsequent Middle Palaeolithic and Upper Palaeolithic phases. A more significant shift in technology and typology can be seen between the earlier and later Acheulian stages than between the later phase of Acheulian and the Middle Palaeolithic. The Upper Palaeolithic of the Subcontinent seems to be as old as that of Europe and the Near East.

V-112: Misra, V.N. 2001b. Prehistoric Human Colonization of India, *Journal of Biosciences* 26(4): 491-531.

This article gives an exhaustive account of prehistoric human colonisation in India covering a span of at least past half a million years. It begins with introduction to periodisation. Main features of the earliest cultures such as the Sohanian, Acheulian, the Middle Palaeolithic and Upper Palaeolithic have been described that include palaeoenvironment, chronology, geographic distribution of the sites, fossil evidence and development of technology. A change in subsistence took place in the Mesolithic phase with intensified food collecting and shift towards settled life. Other important points discussed include the spread of agriculture, evidence from Mehrgarh, Chalcolithic cultures, Indus civilisation, emergence of farming communities outside the zone of Indus civilisation, Neolithic cultures of Kashmir Valley, the Vindhyas and Ganga Valley, eastern India and south India. Significant developments took place during the Chalcolithic period that include introduction of copper-bronze for making tools and weapons, improved architecture, and wheel-made pottery. The Chalcolithic cultures such as Ahar culture, Malwa culture, and Jorwe culture have been described. The introduction of iron technology was crucially important to the expansion of agriculture-based settled life. The principal features of the Iron Age, Megalithic monuments, spread of iron technology to south India, and demographic composition of India have been described.

V-113: Misra, V.N. 2001c. The Role of the Rigvedic Sarasvati in the Rise, Growth and Decline of the Indus Civilization, *Annals of the Bhandarkar Oriental Research Institute* 82: 165-191.

This paper is the printed version of the lecture given on the occasion of the 73rd death anniversary of Sir R.G. Bhandarakar. The author has compared the distribution of Harappan sites on the Indus river and on the dry channel of Ghaggar-Hakra river. Based on literary, folkloristic, archaeological, geomorphological, sedimentological and remote sensing data, the author has suggested that both the Sutlej and Yamuna flowed in the Sarasvati channel in the past. The description of the location, size and desiccation of the Sarasvati river in the Vedic, epic and classical Indian literature matches with the features and history of the Ghaggar-Hakra river.

V-114: Misra, V. N. 2002a. The Mesolithic Age in India, in *Indian Archaeology in Retrospect, I: Prehistory* (S. Settar and Ravi Korisettar Eds.), pp. 111-125. New Delhi: ICHR and Manohar.

This comprehensive review provides a discussion of various issues related to understanding significance of the Mesolithic Age in India. It begins with a brief history of research and position of the Mesolithic phase in Indian prehistory. The other major points covered are geographical spread of the Mesolithic sites in India, settlement pattern, technology, subsistence pattern, dwellings, disposal of the dead, material culture, chronology, Mesolithic art, technological developments and cultural evolution.

V-115: Misra, V.N. 2002b. Excavations of Human Burials, in *Biological Anthropology of Human Skeletal Remains from Bhimbetka, Central India* (K.A.R. Kennedy, J.R. Lukacs and V.N. Misra Eds.), pp. 7-26. Pune: Indian Society for Prehistoric and Quaternary Studies.

Three rock-shelters (III F-13, III F-23 and II B-33) were excavated by V.N. Misra at Bhimbetka (Raisen district, Madhya Pradesh) between 1973 and 1977. Shelter III F-13 had two burials and II B-33 had five burials. The human skeletons excavated from Bhimbetka rock-shelter complex were examined by two palaeoanthropologists, K.A.R. Kennedy and J.R. Lukacs. This article provides basic information about the Bhimbetka hill, rock-shelters, context of human burials and details of stratigraphy of excavated trenches.

V-116: Misra, V.N. 2002c. Mesolithic Culture in India, in *Mesolithic India* (V.D. Misra and J.N. Pal Eds.), pp. 1-66. Allahabad: University of Allahabad.

The Mesolithic period, even though it covers only a few thousand years in the long history of humankind, has enormous culture-historical importance. Equipped with the intimate knowledge of the biological world around them, the Mesolithic people began to domesticate plants and animal around nine thousand years ago. This keynote address to the seminar organised in 1996 at Allahabad furnishes an exhaustive review of research conduced so far regarding this very important cultural phase in Indian prehistory. It includes a brief history of research covering the period from 1867 to 2000. Other major areas of research reviewed are the geographical distribution, demographic implications, settlement patterns,

palaeoenvironmental setting, technology and material culture, subsistence pattern, disposal of the dead, biological anthropology of human skeletal remains, art, and chronology. Details of dates and list of excavated Mesolithic sites are given in the tabular format. The article contains thorough discussion about technological developments, cultural evolution and assimilation of hunter-foragers into the Hindu caste society.

V-117: Misra, V.N. and R.K. Mohanty 2002. A Rare Chalcolithic Pottery Cache from Balathal, Rajasthan, *Man and Environment* 26(2): 67-74.

During the excavations at Balathal (Udaipur district, Rajasthan) a set of pots was unearthed from the Chalcolithic context. This set had seven pots: three painted Black-and-Red ware bowls, two medium-sized pots, and one small Grey ware pot. One of the medium-sized pots contained a large quantity of steatite disc beads, and Job's tears (*Coix lachryma jobi*) or the seeds of coix. All the six pots were carefully kept inside a large Grey ware jar and placed near a fireplace. A total of 30 radiocarbon dates are available to date the Chalcolithic deposit. The dates range from 3700 to 1800 BC (calibrated) and the date of the large jar found near a fireplace itself is 2880-2462 BC (calibrated).

K-118: Kanungo, A.K. and V.N. Misra 2003-2004. Excavation at Kopia: A Preliminary Report, *Puratattva* 34: 116-126.

This article describes preliminary findings of the excavation conducted at the site of Kopia (26° 52' N; 83° 04' 50" E) in Sant Kabir Nagar district of Uttar Pradesh. It contains various sections describing observations made by other scholars: the geomorphic observations (S.G. Deo and S. Ghate), pottery (V. Shinde and others), structures, animal bones (P.P. Joglekar), terracotta figurines (M.K. Dhavalikar), coins (S. Ansari), seals and stamps, beads, stone objects, crucibles, and glass objects. Stratigraphy and chronology are not conclusive, but the site seems to date between the 6th century BC and Sunga-Kushana period.

V-119: Misra, V.N. 2004. Contribution of Anthropology and Archaeology to Understanding the Evolution of Indian Society, *The Eastern Anthropologist* 57(1): 1- 27.

Contemporary Indian society has enormous bio-cultural diversity and complexity. It has various biological, social, economic and linguistic aspects. These can be explained only with help of data from several fields such as archaeology, anthropology, history, linguistics. In this paper, which is the text of the D.N. Majumdar Memorial lecture delivered under the auspices of the Indian Social Science Association, the author has made an attempt to explain the diversity in the present-day Indian population, particularly the composition and distribution of Scheduled Tribes and Scheduled Castes, prevalence of different economic modes, diversity of social institutions, customs, variety of languages and dialects in the light of anthropological, archaeological and linguistic data.

V-120: Misra, V.N. 2005. Archaeology of Pakistan and North and Central India during Fourth-First Millennia BC and Its Bearing on the Dispersal of Indo-Aryans, in *A Discourse on Indo-European Languages and Culture* (D.N. Tripathi Ed.), pp. 175-189. New Delhi: ICHR.

Of the several linguistic and cultural streams, which have contributed to the formation of Indian society and culture, the Aryan stream is without doubt the dominant one. About 73 per cent of Indian population speaks Indo-Aryan languages. The earliest form of Aryan culture is represented in the Rigveda, which is the oldest document of the entire humankind. The original home of the Indo-Aryans within Indian Subcontinent can be identified based on rivers mentioned in the Rigveda. It is clear that the authors of the Harappan civilisation and Rigvedic Aryans came into contact with each other on the banks of river Saraswati and the two cultures influenced each other. Several cultures flourished in Pakistan and northwestern India between the fourth and first millennium BC such as the Gandhara Grave culture, the Late Harappan culture, OCP culture, PGW culture, Ahar/Banas culture, Cemetery `H' culture, and Malwa culture. The author has evaluated the archaeological evidence and concluded that all these Chalcolithic cultures appear to belong to Indo-Aryan language speakers. Perhaps these people entered India as different groups with their distinctive cultural traditions at different times over a long period of 4000 to 1500 BC

SECTION II

Index to places, sites, co-authors and subjects

SECTION III

List of other contributions by Prof. V.N. Misra

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Situating V.N. Misra in Indian Archaeology: A Historiographical Account

Kishor K. Basa

The study of archaeology - a means of reconstructing the past on the basis of material remains - has both an empirical and a theoretical dimension, although the two are interrelated. Historiography involves an analysis of the trends and trajectories a discipline takes in both its empirical and theoretical fields. Such a study on trends and trajectories can be made in general terms by taking a period under review (i.e. colonial or post-colonial or a century etc.); it can be done also by analyzing the contribution of an individual. Recently, emphasis has been put on historiography of Indian archaeological writings during colonial period (Chakrabarti 1988a, 1997; Basa 1998) or on individual archaeologists during colonial period (Singh 2004). For the post-colonial period (Chakrabarti 2003) general surveys have been made in relation to application of processual (Paddayya 1990; Fuller and Boivin 2002) and post-processual (Boivin and Fuller 2002) approaches in Indian archaeology. However, except perhaps on Wheeler and Sankalia, not much stress has been given on evaluating the works of individual archaeologists in a historiographical sense, unless one includes a number of felicitation volumes associated with 'valorization' of individual archaeologists. And yet such critical studies on individual archaeologists are essential for understanding and appreciating the complex and subtle aspects of the discipline of Indian archaeology. The present paper is a modest and humble attempt firstly to review the work of Professor V.N. Misra who has made significant contribution to Indian archaeology during the last five decades and secondly, to situate him in the contemporary archaeological traditions of India.

Brief Life History

Born on 17th August, 1935 and son of Rajeshwar Dayal and Shakuntala Misra in Khandauli village of Farrukhabad district of U.P., Virendra Nath Misra studied MA in Anthropology from University of Lucknow and was a student of Prof. D.N. Majumdar. Since Majumdar wanted to develop the prehistoric archaeology section of his department, he recommended V.N. Misra to be trained under Prof. H.D. Sankalia at Deccan college, Pune. While an M.A. student Misra had read Vincent Smith's paper on pigmy stones and Grahame Clark's works on Mesolithic England and Europe. He was keen to work on the prehistory of Mirzapur which had both 'pigmy stones' i.e. microliths and evidence of rock art. However, on arrival at Deccan College in 1958, Sankalia suggested to Misra that Rajasthan is *terra incognita* as far as prehistory is concerned and hence Misra should take up that area for his research. Misra agreed and completed his Ph.D. in 1961 on Stone Age Cultures of Rajputana. He was for a short period a lecturer in Lucknow University. However, after the demise of Majumdar he joined the Deccan College as a faculty in 1962 and continued to remain in Deccan college till his retirement in 2000 as Director, except for a year (1983-84) when he was a professor of anthropology at Lucknow University. He acted in various capacities in Deccan College, Head of the Department of Archaeology, Poona University (located at Deccan college), Joint Director and Director. It was during his time that Deccan College started functioning as a Deemed University.

Married to Mrs. Tara Misra in 1955, Misra has one son and one daughter. He has several academic distinctions - Homi Bhabha Fellow, Leverhulme Visiting Fellow at ANU, Canberra, Senior Fulbright Fellow at UC, Berkeley, National Fellow, Indian Council of Historical Research, etc. He was President of the Indo-Pacific Prehistory Association and Anthropology and Archaeology Section of the Indian Science Congress and Secretary General of the World Archaeological Congress - 3 (Delhi 1994). He has delivered a number of lectures including the Paramananda Acharya Centenary Lecture at Utkal University. He is a founding father of the Indian Society for Prehistoric and Quaternary Studies and is editing its journal *Man and Environment* which has become the most important Indian journal in archaeology. After his retirement, Misra is living in Pune and continues to pursue archaeological research.

Fieldwork

A worthy student of Sankalia and true to the Deccan College tradition, V.N. Misra has maintained all through a keen interest in field work since field data for him have enduring value. On the basis of his survey in Rajasthan (then known as Rajputana) (1958-60), he reported the discovery of Lower Palaeolithic, Middle Palaeolithic and Mesolithic artefacts in his Ph.D. thesis. After his

Ph.D., he continued his survey work in south Rajasthan whose results were published as a Deccan College monograph *Pre-and-Proto-History of the Berach Basin, South Rajasthan* (1967). Around 1965 the German archaeologist L.C. Leshnik wanted to collaborate with Misra. Influenced by Braidwood's work at Jarmo in west Asia, Leshnik wanted to survey the foothills of the Aravallis to understand the transition to/emergence of agriculture. They conducted an extensive survey in southwest Rajasthan, northern Gujarat, and Saurashtra but did not find any early agricultural settlement in the foothills of the Aravallis. They located a number of pottery scatters in the lower Luni valley which, however, appeared to be of recent age. They also found a number of microlithic sites, two of which, Tilwara in Barmer district, and Bagor in Bhilwara district turned out to be important. Leshnik did not continue the work, but Misra excavated Tilwara in 1967 and Bagor during 1967-70, the latter being so far the biggest excavation of a Mesolithic site in India. There was uninterrupted excavation of more than 90 days in each season, and of the excavated material nothing was discarded at the site, including the entire animal bone relics. Bagor was extremely rich in bone material. It was the first archaeological site in India from which the entire bone material was systematically colleted, weighed and stored.

Misra was very keen that this rich collection should be properly studied by a properly qualified person, but as there was no one at the Deccan College to do this, he sent the material, one after the other, to two outside specialists, namely Dr. Dolly Shah of the M.S. University, Baroda, and Dr. K. R. Alur of Dharwad, but both of them were unable to study it. Fortunately, around the same time Prof. K.T.M. Hegde of Baroda University, sent one of his students, P.K.Thomas, to do Ph.D. under Misra. As Thomas had studied zoology at B.Sc. level, Misra advised him to study the Bagor bone collection for his Ph.D. For this purpose a representative reference collection of the bones of living animals - both wild and domestic - that are represented at archaeological sites, was absolutely necessary. Only by comparing the fragmentary bones found in excavations with the complete bones of living animals, can an archaeozoologist identify the animals represented in the bone collection from an archaeological site. Misra, later helped by Thomas, built such a collection by (a) obtaining skeletal specimens of some animals on loan from the Zoological Survey of India, Bombay Natural History Society, and Bombay Veterinary college; (b) purchasing some skeletons from commercial providers, and (c) preparing some inhouse. Wherever he and Thomas would come across a dead animal, they will get it to the Department and bury it in the compound for six months or so and then dig it up after insects and other natural agencies had thoroughly cleaned the bones. At Bhimbetka Misra found a jackal fatally injured by being caught in an iron trap laid by a hunter. He buried it in the excavation camp and dug out the bones next year. He got an almost complete deer skeleton from a deep pit in the crater created by the atomic blast at Pokharan in 1974. Later, Thomas developed the lab further and today it is the best equipped archaeozoology lab in the country in respect of resources as well as professional expertise.

Misra invited Dr. A.T. Clason, a leading archaeozoologist from the Archaeologisch-Biologisch Institut at Groningen, The Netherlands, whom he had met in 1970 during his visit to the Institute, to visit the Deccan College and train Thomas in archaeozoological techniques. Clason spontaneously accepted the invitation, expecting only free accommodation, and spent six months in the college in 1972. She gave a sound training to Thomas, and today he is the best archaeozoologist in India. Thomas has produced several Ph.D.s, including one from Japan, and two of them, P. P. Joglekar, and Arati-Deshpande-Mukherjee are his colleagues. The trio, along with their students, are always busy because they study the faunal material not only recovered from the excavations carried out by the Deccan College but also that sent by a number of other institutions like the Archaeological Survey of India (ASI), State Archaeology Departments and universities like those of Allahabad and Banaras Hindu University (BHU). Around this time because of Sankalia's vision labs in palaeontology and palaeobotany also developed with M.D. Kajale and G.L. Badam, respectively being incharge of them.

Misra was influenced by Francois Bordes, whose excavation at Pech de l'Aze he had attended in 1970, and other French prehistorians, in developing palaeolithic and microlithic typologies for Indian assemblages, and which he has applied to the collections from Bagor and Bhimbetka. As a result of his participation in Bordes' and De Lumley's excavations and visits to a number of other excavations and cave art sites in France, Misra

realized the importance of caves in stone age research. Later, on the invitation of V.S. Wakankar, who had discovered the rock art site of Bhimbetka in 1957, and the advice of H.D. Sankalia, Misra excavated three rock shelters at Bhimbetka from 1973 to 1977, and found excellent evidence for human occupation from the Late Acheuian to late Mesolithic. Recently, Bhimbetka has been declared a World Heritage Site by UNESCO.

From 1977 to 1985 Misra worked with a multidisciplinary team comprising S. N. Rajaguru, a number of research scholars, and, at different stages, D.P. Agrawal and A.K. Singhvi of PRL, Ahmedabad, R.P. Dhir of CAZRI, Jodhpur, and R.J. Wasson and Gurdip Singh of ANU, Canberra, on the prehistory and Neogene-Quaternary environment of western Rajasthan, with special emphasis on the area around the Didwana town in Nagaur district. He conducted extensive explorations, discovered a number of stone age sites, and excavated the primary context Palaeolithic sites of Singi Talav, Indola-ki-Dhani and Bangar canal near Didwana. The excavation of a 20 m deep trench in a fossil dune at Bangur canal, exposing multiple horizons of dune accumulation and stabilization, presence of palaeolithic assemblages of different stages in them, and their dating by radiocarbon, TL, and U/Th decay series, has made a very significant contribution to our understanding of the evolution of the environment in the Thar desert and human adaptations to it. It is a major landmark in South Asian prehistory.

During 1988-90, Misra, jointly with Rajaguru, excavated a primary context Middle Palaeolithic site at Samnapur on the Narmada river in Narsinghpur district of Madhya Pradesh.

From 1994 to 2000 Misra led a large multidisciplinary team to excavate the Chalcolithic and Early Historic site of Balathal in Udaipur district of Rajasthan which he had discovered in 1963. This excavation has added considerably to what was known about the Chalcolithic culture of Mewar from the earlier excavations at Gilund and Ahar, and has also shown that it was a major iron working centre during the early historic period. Forty-five radiocarbon dates – the largest series for any archaeological site in India – show that the Chalcolithic Balathal flourished between 3700 and 1800 BC, and the early historic between 400 BC and 300 AD. Balathal was thus contemporary to Early and Mature Harappan civilizations, and is the oldest known village settlement in India.

More recently Misra has been helping A.K. Kanungo in excavating the site of Kopia in Sant Kabir Nagar district of U.P., known as a major glass producing and manufacturing centre of the early historic period.

Besides coordinating fieldwork in pre-and-proto history, Misra has worked on the rock art of central India in general and Bhimbetka in particular. He has also conducted ethnographic fieldwork among various tribal groups of Rajasthan and central India to add flesh to the bones of archaeological data. In short, Misra has done extensive and intensive fieldwork in prehistory, protohistory (also early history), rock art, and ethnoarchaeology. In terms of geographical areas, his fieldwork was in Rajasthan, Madhya Pradesh, Gujarat and Ganga valley. With this general background, various issues raised and approaches followed by Misra will be discussed under four headings: Prehistory, Protohistory, Rock art and Ethno-archaeology.

Prehistory

Misra's major contribution has been in the field of prehistory.

(i) Terminology in Indian Prehistory

An important issue Misra (1962a) raised during early 1960s relates to the problem of terminology in Indian prehistory. At that time, three sets of terminology were used to describe the Indian prehistoric sequence. The first was after the European fashion i.e. Lower, Middle, Upper Palaeolithic, Mesolithic and Neolithic. The second was after the South African fashion, Early, Middle, and Late Stone Age, and Neolithc. The third consisted Series I, II, III, etc., and was used by Sankalia to describe the culture sequence at Nevasa. Misra was in favour of the European terminology. In order to substantiate this he followed two means - (i) he pointed out the limitation of the other two sets, and (ii) responded to the criticism against European terminology. As regards the South African system of Early Middle and Late Stone Age, Misra pointed out that in archaeological literature the European terms Palaeolithic, Mesolithic and Neolithic "have become part of the thought pattern of scientist" and educated layman alike: and hence the new terminology (of Early, Middle, and Late Stone Ages) "will create much confusion" (1962a: 121). Secondly, Misra added, the term Middle Stone Age

"is English translation of Mesolithic and is likely to be confused with the latter" (1962a: 121).

According to Misra until 1950s our knowledge of Indian Palaeolithic was, with a few exceptions, confined to one phase, i.e. the handaxe-cleaver stage of peninsular India and its equivalent Early Sohanian in the Punjab. This was usually designated as Lower Palaeolithic. However, in 1956, Sankalia reported a sequence of three lithic industries at Nevasa in Maharashtra. The sequence consisted of (1) a handaxe-cleaver industry at the bottom associated with a Middle Pleistocene fauna, (2) a flake industry of scrapers and points, and (3) a blade industry with a microlithic tendency. Sankalia designated the three industries as Series I, II, and III.

Misra found two main problems with the scheme. Firstly, it was confusing. He rightly pointed out that, "suppose an investigator finds in an area a Palaeolithic industry similar to that of Series II of Nevasa. He immediately reports it as Series II of his area. Now strictly speaking this industry will be Series I in its own area. The present usage is therefore confusing" (1962a: 115-6).

Secondly, these terms, Misra argued, did not express the status of a particular culture in widely intelligible terms such as Lower Palaeolithic, Middle Palaeolithic, etc. Hence by adopting these terms, the problem was not fully solved.

Misra also responded to the objections raised against the European terminology which were twofold. The first objection was that in India adequate palaeontological evidence was not available for defining these terms. He said that to think that divisions of the Palaeolithic are chronological periods to be defined by palaeontological criteria was 'misleading'.

On the other hand, "they are essentially divisions of archaeological time and need to be defined strictly and solely by cultural and technological criteria" (1962a: 121).

The second criticism against European terminology was that the Indian archaeological data did not fit into European frame. Misra responded by arguing that there were three broad technological stages in the Palaeolithic represented by (i) the core tool cultures which had two traditions – an earlier pebble tool tradition and a later handaxe-cleaver tradition, (ii) the flake tool cultures mainly founded on the Levallois technique or its variants, and (iii) the blade tool culture. These three stages could be distinguished as Lower, Middle and Upper Palaeolithic. Thus archaeologically, two stages of Indian Palaeolithic had, Misra argued, "close similarity to the two stages (Lower and Middle Palaeolithic) of Europe" (1962a: 122). Only the Upper Palaeolithic in India, Misra confessed, was 'poorly known' at that time (1962a: 119). However, the European terms of Mesolithic and Neolithic could be used, Misra further added, "in India without raising any problem" (1962a: 119).

Thus, for Misra the use of European terminology in Indian prehistory was to be accorded preference since the European terminology was 'more precise and easily intelligible". Three points need to be mentioned as regards Misra's discussion on terminology for Indian prehistory. First, although Misra in general accepted the European terminology for Indian prehistory, he was not a reductionist and hence he advocated for 'terminological recognition' of what he called "the cultural individualities of different areas" (1962a: 122). Second, despite Misra's claim that European terminology was 'more precise', its application to Indian Prehistory during late 1950s and early 1960s was not free from problems as he himself had accepted that Upper Palaeolithic in India then was 'poorly known'. In the absence of the recognition of a well established Upper Palaeolithic sequence in Indian prehistory at that time, the European terminology as applied to India was Lower Palaeolithic, Middle Palaeolithic, Mesolithic and Neolithic, thus with a gap of Upper Palaeolithic. Hence, despite Misra's claim, the problem was not over altogether.

This problem would be redressed later when work in different parts of India during late 1960s onwards would establish Upper Palaeolithic as a distinct stage (Murty 1979; Raju and Venkatasubbaiah 2002). Third, although Misra took account of Sankalia's Series I, II and III into consideration, he did not discuss Series I, II, III and IV as delineated by Burkitt and Cammiade (1930). Misra's otherwise comprehensive paper would have been further strengthened if he had included and critically discussed Piggott's account in his discussion on terminology.

(ii) Palaeolithic

An important aspect of Misra's prehistoric studies in general and on Rajasthan in particular is his emphasis on ecological background of the stone age cultures (Misra 1976c, 1987a, 1987b; Misra and Rajaguru 1982, 1987). For reconstruction of such background he either led, or became part of, an interdisciplinary team. A good example is the U.G.C. sponsored interdisciplinary project on Thar desert in which Misra and Rajaguru (1987) were the key members aided by other faculties of institutions like Physical Research Laboratory (PRL), Ahmedabad, Central Arid Zone Research Institute (CAZRI), Jodhpur, and Australian National University (ANU), etc. The main aspects of the work on the Thar desert were summarized by Misra and Rajaguru (1987):

(1) Extensive reconnaissances of the Thar desert were undertaken to collect archaeological and geological data, and studies of sand dunes were made to understand their morphology, distribution pattern, and weathering profiles. Moreover, wells, tanks and quarries were studied to determine the nature of fluvial sediments and for locating archaeological sites in them.

(2) Excavations were carried out at Jayal and Didwara in Nagaur district which became "the first excavation of palaeolithic sites carried out in the desert" especially in a primary context (Misra and Rajaguru 1987).

(3) On the basis of a nearly 20 m deep trench through a fossil sand dune at Didwana, the stratigraphy of various sand dune phases has been revealed in the form of three major lithounits and at least four palaeosols spannig a period of 70,000 years. What is more important is the recovery of stone implements on two horizons.

(4) 'For the first time anywhere in the world', thermoluminescence dating technique was used for dating sand dunes by A.K. Singhvi and D.P. Agrawal of PRL.

(5) Moreover X-ray diffraction analysis and Scanning Electronic Microscopy as well as mechanical and petrological analyses for understanding the formation of sediments were also done.

(6) By digging a well in the deepest part of the Didwana salt lake, an attempt was made to recover the stratigraphy and samples for sedimentological, palynological and radiometric analyses for the period before 10,000 years.

According to Misra and Rajaguru (1987), about one million years ago the Thar was watered by powerful streams. The relict bouldery beds, best developed near Jayal in Nagaur district, provide the geomorphic evidence for such powerful streams. During the formation of these gravels the Thar was receiving a much higher rainfall than today. Around half-a-million years ago the powerful drainage system got disorganized, giving way to the emergence of less powerful and meandering streams. It is during this period that the first evidence of the appearance of man in the area is available in the form of the camp sites of Lower Palaeolthic man discovered at a number of places around Didwana in Nagaur district. Artefacts like handaxes, cleavers, choppers, chopping tools, polyhedrons, etc. were found embedded in the soft loamy sediments of lakes and pools and scattered on the surface of the bouldery beds of an earlier age. No bone has been recovered. However, on the basis of animal remains found in association with lithic remains of comparable technological stage in the Narmada and Godavari alluvium, Misra argued that the Acheulian denizens of the Thar must also have resorted to hunting of large herbivores and possessed a social organization suitable for group hunting. Excavation at Singi Talav near Didwana yielded evidence of one of the earliest uses of semi-precious stones by prehistoric man in India in the form of a few quartz crystals in association with lithic Artefacts. During the long period of occupation of the Acheulian people lasting several hundred thousand years, the technique of lithic tool making became refined during Late Acheulian period. Thus tools became more symmetrical in outline, thinner and had more even surfaces and were made on small flakes.

By around 100,000 years ago environmental changes in the Thar occurred with decline in rainfall and shifting of river courses to the west (possibly as a response to tectonic movements in their headwater region). The well integrated drainage system became completely defunct by around 70 to 60 thousand years ago. While the reduced rainfall affected the vegetation growth, strong winds blew sand and silt particles from thickly alluviated surfaces and deposited them on the land surfaces of western Rajasthan which led to the formation of thick and large sand dunes and sand sheets. However, the climate was not

uniformly aid throughout. On the other hand, there were several occasions of short periods of increased rainfall when man reappeared in the area with the growth of vegetation and flourishing of animal life. While the onset of aridity forced the Middle Palaeolithic people to migrate to the southern part of the Thar, in the Luni valley (which received good rainfall from the Aravalli hills), hunter-gatherer bands reappeared whenever conditions ameliorated in the northern part of the Thar. In this regard, Misra referred to the finding of stone artefacts at two horizons, at depth about 10 and 6 m from the surface, from the excavation of the fossil dune at Bangar Canal. Besides scrapers and carefully struck thin flakes, symmetrical blades were also found. An important discovery from the Upper Palaeolithic horizon was the recovery of a very small, thin and symmetrically shaped oval handaxe and of another freshly made larger handaxe. These finds, according to Misra, show that much elements of Acheulian technology survived in this culturally backwater zone till the Upper Palaeolithic period. This horizon has been dated to about 26,000 years by radiocarbon dating. The smaller handaxe 'a masterpiece of stone age man's craftmanship'- was "the youngest tool of the kind in the world and probably the only one to be found in a sand dune" (Misra and Rajaguru 1987: 27).

An important aspect of the study is the corroboration of the history of arid climate preserved in the dunes by the sediments deposited in the salt lake at Didwana. On the basis of data from Didwana and several other lakes, Misra argued that these lakes came into existence due to the disorganisation of the drainage system of the Thar. However, the periodical filling and drying up of the lake is known from lake sediments dated to before 10,000 years in the form of alternating bands of sands, clay and evaporites.

In south-east Rajasthan, on the basis of his survey Misra reported "an almost uninterrupted occupation of the Berach basin from the beginning of the primitive hunting and food gathering at sometime during Middle Pleistocene to the emergence of full-fledged farming communities at the beginning of the second millennium BC" (Misra 1967: 200). Evidence of Acheulian culture was recorded from all the four river valleys in the basin - Berach, Gambhiri, Wagan and Kadmali. The general stratigraphy comprised the bouldery gravel overlying either the basal rock or its weathered product - the mottled clay - and underlying either a silt deposit as in the Berach and the Gambhiri or a second mottled clay as in the Wagan and the Kadmali. Because of the absence of palaeontological evidence in the implementiferous gravels or in other deposits, the relative chronology of the four industries, Misra argued, could not be established on that ground. He found a striking homogeneity in typology among the four industries. However, there was considerable heterogeneity among the three major industries (Berach, Gambhiri and the Wagan) in terms of size and shape of the handaxes. In particular, the differences were significant between the Gambhiri industry on the one hand, and the Berach and Wagan industries on the other. According to Misra, "whether this variety reflects differences in time or in cultural tradition cannot be determined in the absence of a more precise chronological framework" (1967: 200). Misra further pointed out that the focus of the Acheulian culture in Rajasthan lies in the southeastern part of the state with the Berach basin forming the western limit of the Acheulian province.

The Middle Palaeolithic (Misra used the term Middle Stone Age, MSA, in his 1967 monograph) is less widely distributed in the Berach basin. Stratigraphically, the Middle Palaeolithic artefacts occurred in the sandy gravels separated from the bouldery gravels of the Lower Palaeolithic by a mottled clay deposit. A cultural continuity from the Lower Palaeolithic to the Middle Palaeolithic is discerned from the presence of Lower Palaeolithic tools in the same gravels. Some elements of Acheulian like handaxes and core scrapers no doubt continued in the Middle Palaeolithic 'in an evolved form and in reduced measure'. But cleavers and discoids are absent. The principal tool type of the Middle Palaeolithic was scraper, followed by point. The Levallois element was also more pronounced in the Middle Palaeolithic than in the Lower Palaeolithic. Statistically there was significant difference between Middle Palaeolithic and Lower Palaeolithic industries in respect of proportion of various tool types, of core and flake tools, and of shaped and unshaped tools. According to Misra, "the development of the MSA (Middle Stone Age) culture in the Berach basin would appear to be inspired partly by the indigenous cultural tradition and partly by external stimuli. In what measure precisely the two sources contributed cannot be said definitely, first because the MSA culture itself is inadequately known, secondly

because the stratigraphic evidence bearing on the relationship of the two cultures is at present inadequate, and thirdly because even in the neighbouring areas the MSA culture is imperfectly known" (1967: 203).

Misra (1976a, 1978, 1980) also reported Middle Palaeolithic sites from the central Luni basin, western Rajasthan (Misra 1962a). The composite stratigraphy in the middle reaches of Luni comprised (from top to bottom) (1) silty sand (1 to 3m thick) showing a sharp contact with (2) cemented pebbly gravel (1 to 2m thick) showing sharp contact with (3) whitish clayey silt resting unconformably on bed rock. Middle Palaeolithic factory sites were reported from the central Luni basin where raw materials like chert, chalcedony, flint, quartzite and silicified wood were available in plenty. Middle Palaeolithic tools were found in the river beds as well as in stratified gravels. They include varieties of scrapers, points, flake knives, flakes, blades and diminutive handaxes and cleavers. On the basis of the presence of handaxes and cleavers, even though in small numbers, Misra inferred that the Palaeolithic Luni culture should belong either to the end of Acheulian or to the beginning of the Middle Palaeolithic phase (Misra 1962).

Talking about the excavated Acheulian sites in India, Misra recognized two clear phases (Misra 2001a). The first and the earlier phase that included the industries from Lalitpur, Adamgarh, Kuliana, Mahadeo Piparia, Chirki-Nevasa, Anagwadi and Hungsi was characterized by all or most of the following features: high percentage of chopper-chopping tools and bifaces, low percentage of non-biface tools made on flakes, high ratio of handaxes to cleavers, low incidence of blades and Levallois flakes and predominance of stone hammer flaking technique. The second and later phase is associated with rockshelters IIIF-23 and IIIF-24 at Bhimbetka and cliff gravel at Mahadeo Piparia.

Misra also worked on the Acheulian culture of central India by excavating rockshelter IIIF-23 at Bhimbetka. According to him, the characteristic of the Bhimbetka Acheulian industry is a very low percentage of bifaces, high proportion of cleavers to handaxes, a remarkably high standard of workmanship in bifaces, especially cleavers, predominance and great diversity of non-biface tools, high percentage of end scrapers, and Levallois flakes, and complete absence of chopper-chopping tools (Misra 1976a). Misra considered the Bhimbetka Acheulian industry representing the terminal phase of the Acheulian tradition, because layer 5 which overlay the Acheulian deposit was stratigraphically and culturally a continuation of the Acheulian culture except for the disappearance of the biface element and a certain decline in the standard of workmanship.

At Bhimbetka, the stratigraphic evidence shows that the Middle Palaeolithic culture developed out of the Acheulian culture with the slow disappearance of cleavers and handaxes, reduction of the size of tools and occurrence of a wide variety of side scrapers, Levallois flakes and blades as the main artefacts. The availability of a number of tools made on flat natural slabs of stone instead of flakes from the Middle Palaeolithic level at Bhimbetka was a unique feature (Misra 1985)

Misra also excavated a Middle Palaeolithic site in the central Narmada valley at Samnapur in a primary context (Misra *et al*. 1990) which yielded more than 3000 artefacts and a small number of fragmentary fossilized animal bones. Cherty quartzite, quartzite and dolerite were the raw-materials which were available locally or in nearby places and were used in making tools. The industry was flake based with the occurrence of some blades. Despite the recovery of some faceted platform flakes, no trace of Levallois flakes has been found. Misra argued that it was a manufacturing site since a large number of cores, flakes and chips along with shaped tools were found in a primary context. The shaped tools include single or double side scrapers, end scrapers, denticulates, notches, points, borers, retouched flakes and knives.

A reference to the recovery of Upper Palaeolithic tools has been made from the excavation at rock shelter IIIF 23 at Bhimbetka.

An important aspect of Misra's prehistoric research is his emphasis on quantitative methods. For example, as regards, the Palaeolithic recoveries from Trenches E and F of the Rock shelter III F-23 at Bhimbetka, Chi-square and two sample tests such as Mann-whitney U list and 't' list were used to examine the temporal variation of Palaeolithic assemblages from the primary context (Alam and Misra 1992).

(iii) Mesolithic

V.N.Misra is the best authority on Mesolithic Culture of India. Right since his paper on Mesolithic in *Indian Prehistory 1964* edited by him and Mate (1965), Misra has written several review papers on Mesolithic cultures (Misra 1989b, 2001a, 2002a, 2002b). According to him, for a variety of reasons, evidences for the Mesolithic period in India, despite its duration of only a few thousand years, "is far richer than of the preceding Palaeolithic period which lasted for more than a million years" (Misra 2002a: 4). First, all the dated Mesolithic sites belong to the Holocene and are well preserved since no significant geomorphic changes have occurred during this period. Second, more than two thousand microlithic sites have been discovered all over the country barring the greater part of the Ganga plains, northeastern India or much of the Western Ghats. Third, over thirty sites have been excavated yielding good information on the technology, material culture, subsistence and disposal of the dead. Fourth, there is good percentage of human skeletal and animal remains in a number of sites. Excepting the Pleistocene human find from Hathnora in the Narmada valley, these comprise the earliest human skeletal remains in India. Sixth, at a number of sites, there is abundance of rock paintings, associated with Mesolithic sites. Finally, about fifty radiocarbon dates available help us in determining the antiquity and the processes of evolution of Mesolithic sites.

Misra (2002b: 114) ascribed ecological reasons for the absence or sparseness of lithic sites in some part of India. For example, lack of stone for making tools is the cause for total absence of Mesolithc sites over much of the Ganga plain (except the south-central region). Besides, heavy rainfall and consequent dense vegetation could be the reason for the sparseness of sites in north-east India and the Western Ghats. Reviewing the stone age cultures from an ecological perspective, Misra (1989a) said that the Mesolithic folk not only more intensely inhabited the previously colonized habitats, but also extended their colonization into various areas like the Ganga valley, Damodar valley, the hilly tract of Gujarat, the Kerala coast and the southern Tamil Nadu coast. Moreover they exploited a greater variety of habitats than their predecessors. For example, Misra stated,

" In the Gujarat plains they settled on sand dunes on the shores of inter-dunal lakes and in the Mewar plain on elevated rocky ground as well as on river bank dunes. In the woodland zones of the Vindhyas and the Kaimur Range they occupied caves and rock shelters as well as open - air locations. The limestone caves in the Kurnool district of Andhra Pradesh were also occupied during the period. In the wooded ecosystems of the interior Peninsula there are numerous sites right in the habitat of the shifting cultivation of the present day. Along the West Coast, near Bombay, the Mesolithic groups settled on the top of the hills and rock outcrops near the sea coast. Near the tip of the Peninsula, on the east coast, there are occupations on coastal sand dunes (Teris). These coastal occupations are suggestive of marine food exploitation. Likewise, the occupations on the shores of oxbow lakes in the Ganga valley (e.g. Sarai Nahar Rai, Mahadaha and Damdama), those close to waterfalls in the Telengana plateau (e.g. Gauri Gundam and Pochara), around Chitrakot Falls in Bastar, and in the riverine niches of the Eastern Ghats indicate considerable dependence on aquatic food resources" (1989a: 25).

Misra further stated that a dramatic increase in the number of occupation sites in different parts of India is a positive indication of significant demographic increase during early Holocene times. He visualized several factors responsible for the dramatic population growth. According to him,

"Several factors could be responsible for this dramatic population growth. Firstly, it is known from several parts of the Old World that microliths were used as components of arrowheads, spearheads and other tools like knives, daggers, sickles and harpoons. Also, many paintings in rockshelters in central India show the use of bow and arrow and the use of microliths as tips and barbs of arrows. The regular use of bow and arrow must have greatly improved in hunting efficiency of Mesolithic populations and thereby contributed to a more assured food supply. Secondly, querns and rubbers appear for the first time in this period and they have been found at many sites, showing that food was processed before consumption. This would have increased the nutritive value of available food and thereby contributed to a better health status. Finally, there is clear evidence of increased rainfall at the beginning of the Holocene from lake sediments and buried soils in sand dunes in Rajasthan and clayey deposits in rock-shelters in central India. This increased rainfall must have contributed to greater plant growth and increase in animal population which in turn would imply

increased availability of food to the human populations" (2002b: 117).

Regarding technology, Misra stated that though microblades were used in varying degrees in microlithic industries all over the country, the highest perfection in the technology was achieved in western and central India. He also mentioned the predominantly geometric type of microliths from Bagor in Rajasthan and Bhimbetka in Madhya Pradesh. The subsistence pattern of the Mesolithic people is known from the recovery of animal bones from a number of sites which is supplemented by depiction of hunting, trapping, fishing and plant food collecting in rock-paintings. As regards dwelling and material culture of the Mesolithic people, our knowledge is limited because of the poor survival of organic material. Evidences of circular huts were found in some rock paintings, and from some excavated sites such as Bagor and Tilwara. Besides, the earliest evidence of intentional disposal of the dead in India is known from the Mesolithic period from sites such as Sarai-Nohar Rai, Mahadoha and Damdama in the Ganga valley, Bhimbetka in Madhya Pradesh, Bagor in Rajasthan, Langhnaj in Gujarat and Lekhahia and Morhana Pahar in Mirzapur district of Uttar Pradesh.

Both in the rockshelters of central India and at the open air sites of Rajasthan, Gujarat and the Ganga valley, the dead were buried in the habitational area. Only in a few cases, grave offerings had been found. For example, at Bhimbetka, pieces of red ochre, bone points, decorated bone pieces, sharply cut and polished antler pieces were placed with the body, and bone and antler earrings and necklaces were found on the skeletons of Mahadaha.

Misra also reviewed the studies made by scholars on the biological anthropology of human skeletal remains which have significant bearing on the physical composition, pathology and dietary habits of the Mesolithic population (2002a: 18-26). In general the Mesolithic people of the Ganga valley were taller and were mere sturdily built than those of Mirzapur rockshelters, Bagor, Langhnaj and Bhimbetka. Misra also stated the two main conclusions drawn by Lukas and Kennedy (2002: 101-107) regarding the Bhimbetka skeletal remains. These are the following: (1) there is considerable biological diversity present in the bones and teeth; and (2) archaeological and stratigraphical data testify to an ancient and relatively continuous occupation of the region of rockshelters and open-air sites.

With this general review, it is important to summarize the results of excavations of three Mesolithic sites by Misra.

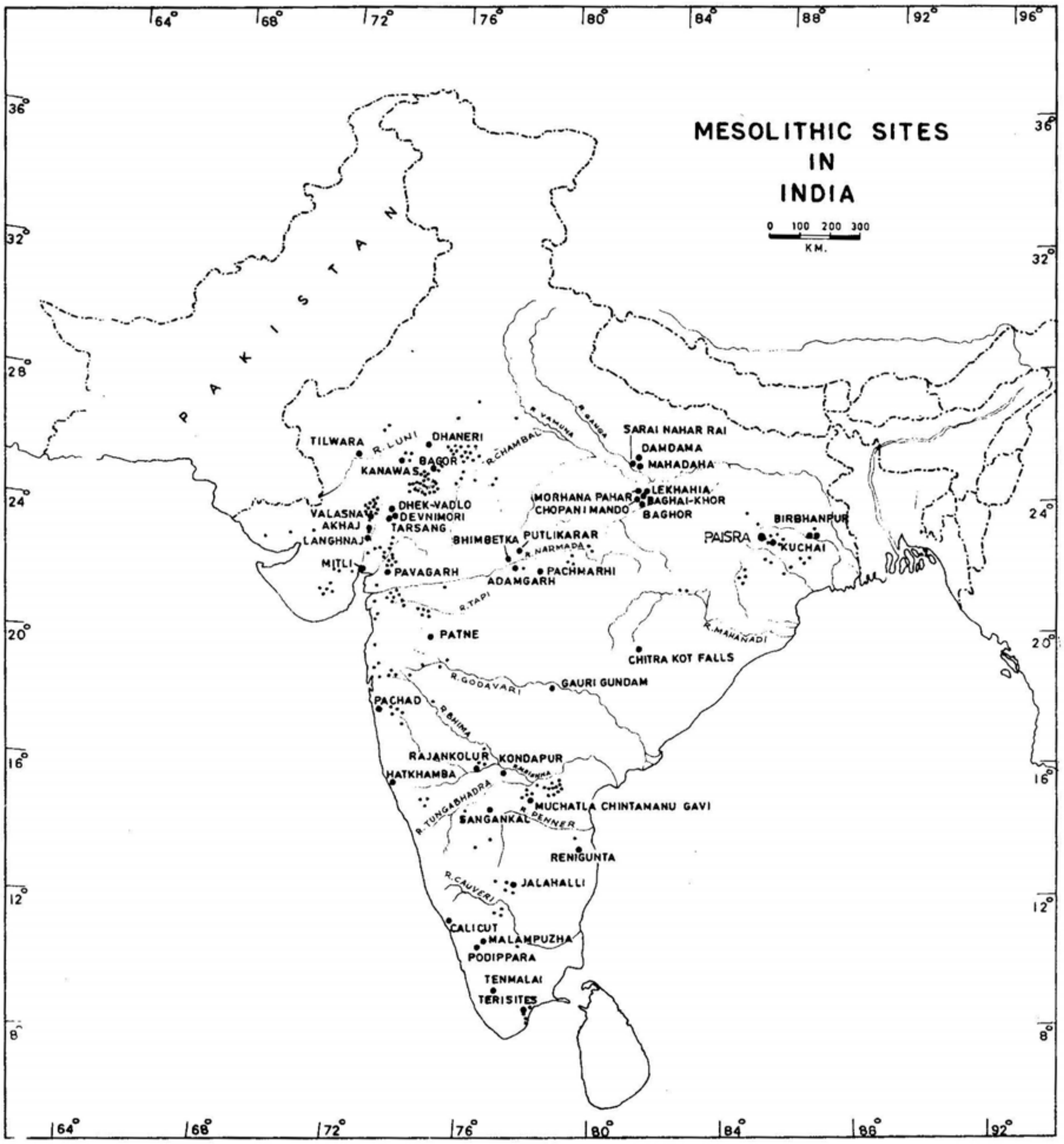
(iv) Excavated Mesolithic Sites

(a) Bagor

Lying on a large and prominent sand dune overlooking the left bank of the Kothari river Bagor is the largest excavated Mesolithic habitation site in India. While in earlier publications, Misra has divided the occupation in three phases (1971, 1973a, 1973b) but later (Misra 1989c) he divided it into two periods in which Phases I and II of the earlier sequence belonged to Period-I and Phase-III to Period II. In Period-I, Phase-I dated to between *c*. 5000 and 2500 BC there were profuse microliths and animal bones implying an economy based on hunting-gathering and herding. 72.2% of the identified bones belong to Period-I. The animals include, sheep, goat, pig, humped cattle, etc. Stone paved floors implied that people lived in huts with probably wattle walls. Excavation of skeletal remains revealed burial of the dead in an extended position. During Phase- II (*c*. 2500-1000 BC) there was decline of microlithic tools and animal bones. On the other hand, copper tools and handmade pottery with incised decoration were recovered. Evidence of flexed burial was found and the associated grave goods include pots, metal tools, ornaments and food offerings. Thus, during this phase stable economy is visualized in the form of plant agriculture and a greater reliance on animal domestication.

Period-II (*c*. 500 BC to AD 200) has yielded a very poor microlithic industry which is perhaps derived from Phase-II. While animal bones became scarce, there was evidence of iron tools, more plentiful pottery (basically wheelmade), glass beads and the use of bricks and tools along with dressed stone in structures.

About 45 to 55% of microliths were recovered from Phase-I. Quartz and chert were the raw materials. While large tools such as scrapers and burins made on flakes or cores were rare, the most common types were blades with flat retouch, blunted-back blades, obliquely truncated and blunted-back blades, triangles, trapezes, crescents and points, etc. From the viewpoint of lithic



Courtesy: V.N. Misra

technology, the virtual absence of the crested-ridge-guiding technique was a distinctive feature.

(b) Tilwara

Misra (1971, 1973a, 1989d) excavated the microlithic site of Tilwara, Dist Barmer, Rajsthan, on the left bank of the river Luni. The lower level has been associated with the Mesolithic phase, with the greatest concentration of microliths unearthed between 20 and 35 cm below the surface. Such microliths included backed blades, obliquely blunted blades, lunates, triangles, points, and a few trapezes of fine workmanship. The raw materials were quartz, quartzite, chert and rhyolite. Arrangement of stones implying the outline of a circular hut was also found. Wheel made grey and red ware were also recovered. Remains of domesticated cattle, and sheep/goat and molluscan shells were also unearthed. The paucity of bone material at Tilwara was interpreted either because of the decay of bones in course of time or because

of the probable consumption of more milk product than the flesh of their bones (Misra 1989d: 266).

(c) Bhimbetka

The habitational deposit of the Mesolithic period at Bhimbetka rockshelter (Misra 1985,1989e) varied from 0.20 m to 1.50 m in different caves. Microliths recovered from Bhimbetka excavation included blunted back blades, obliquely truncated blades, points, crescents, triangles, trapezes, and transverse arrowheads. Chert and chalcedony were the main raw materials. While during the earlier phase of the Mesolithic, blades were longer, wider and thicker, with the passage of time they became smaller and more symmetric. Besides, the proportion of geometric microliths was smaller. An interesting aspect was the recovery of querns and rubbers for the preparation of food. The dead were buried either in an extended or crouched position with the head generally to the east, but sometime to the west. The grave goods included stone querns, rubbers, antlers, bone tools and haematite nodules. The presence of ash, charcoal and charred bones and antlers implied the use of fire regularly by the Mesolithic men.

Protohistory

Balathal

In protohistory (Misra 1992) made a review on research on Indus Civilisation, Besides a major contribution by Misra (and his team) is the excavation of the Chalcolithic site of Balathal (Misra 1997, Misra *et al*. 1995, 1997) in southeast Rajasthan. Misra cited two major reasons for excavating Balathal. Since both Ahar and Gilund - the two most well-known sites of Ahar culture in the Mewar region - were excavated during 1960s, the cultural affinities between two sites and the Harappan civilizations of Gujarat, especially in respects of architecture and ceramics, could not be realized. Besides, both these excavations were on a small scale. Hence a bigger excavation of a site of the Ahar culture was needed. Balathal was excavated from 1994 to 2000 jointly by the Deccan College, Pune and the Institute of Rajasthan Studies, Udaipur. The excavation has yielded evidence of two cultural periods – I. Chalcolithic or Ahar culture and II. Early Historic. The Chalcolithic occupation covered the entire site, but the Early Historic occupation was confined to a small area in the central and southern part of the mound. Over forty structures of both periods have been exposed. The Chalcolithic structures, which comprise residential ones on the outer sides of the mound and a fortified enclosure in the centre, show incipient planning. Stone, mud brick and mud were the principal materials for construction. There were eight structural phases in the Chalcolithic period. Of these four belonged to Phase IA or pre-fortification, and four to Phase IB or post-fortification. Residential structures, apart from isolated ones on the eastern and northern parts of the mound, are grouped into three complexes, which are divided by one street and one lane. In Phase IB II structure 10 was the 'most complete and complex' with at least eleven rooms. The presence of storage bin platforms, fire places, querns, pottery, charred grains and animal bones implies, Misra inferred, that this was a residential complex, probably belonging to the chief of the community. From Phase VII, evidence of two pottery kilns was found. One of these had several elongated and interconnected channels for letting out gases from within, and a large stone quern nearby which was 'almost certainly' used for pounding and kneading the clay used for pot making. The most spectacular Chalcolithic structure is a massive fortified enclosure mud and stone structure, located almost in the centre of the settlement (Misra 1997: 261). Roughly rectangular in shape, it comprised four ramparts or walls made of rammed mud and revetted with semi-dressed stones both on the inner and outer faces and enclosing an area of about 600 sq. m. The average length of the E-W running walls is 35 m and that N-S running walls 27 m.

Regarding the function of the fortified enclosure, Misra suggested three possible explanations. Firstly, it could have been used for some 'industrial activity' since the enclosure contained layers of burnt cowdung, burnt earth and ash. Secondly, it could have been used for sheltering old people, children and cattle during an attack by external enemies. Thirdly, the enclosure could have housed the chief of the community. Misra stated,

"The stone and mud brick structures uncovered at Balathal are unique in the sense that such structures are unknown in the Chalcolithic cultures of central India, the Deccan or the Ganga plains. On the other hand, in their size, complexity and use of stone and bricks, they bear striking similarity to the structures found at the 'Harappan sites of Rojadi, Surkotada, Dholavira and Kuntasi in Gujarat" (1997: 263).

Balathal ceramics consist of two categories of ware: fine and coarse. The fine variety comprised Thin Red ware, Tan ware, Black-and-Red ware, Buff ware and Reserved Slip ware. On the basis of the presence of mica in the clay used for Reserved Slip sherds, Misra argued that this ware was produced at Balathal. Gogte's XRD analysis of such sherds has confirmed this. The coarse ware comprised Thick Bright Red-slipped ware (used for storage), coarse Red ware, Burnished Grey ware and Plain Grey ware.

The tools and weapons of Balathal Chalcolithic people were mainly made of copper. On the basis of plant and animal remains, Misra inferred that the people practised a mixed economy, based on farming, stockraising, hunting, fowling and fishing. Cattle (73%) were the predominant domestic animal, followed by sheep-goat (19%), buffalo (3.10%), and pig. Wild animals were hunted. The recovery of charred bones implies that flesh was roasted on open fire. As regards plants, cereals and lentils appear to have been produced in considerable quantities, and were stored in storage bins. Beads of semiprecious stones and terracotta, and bangles of copper, shell and terracotta were the main types of ornaments of the Chalcolithic people. Terracotta bulls of small size implied their worship. On the basis of findings of similar bull figurines from Marmi in Chittaurgarh district Misra (Misra *et al*. 1993) proposed two hypotheses. The first was that these bull figurines might have been made at that site and exported to other places. The second possibility was that there could have been a shrine of bull cult at Marmi where the figurines were offered to the deity by people from Marmi and adjacent villages.

Forty-five radiocarbon dates are available from Balathal - 30 from the Chalcolithic levels and 15 from the Early Historic. Of the former, 25 (calibrated), which are stratigraphically consistent, range from 3700-3620 BC to 2200-1800 BC, making the earlier part of Balathal older than the Early Harappan, and the later part contemporary with Mature Harappan cultures and the oldest known farming-based settlement in India. Of the 14 (calibrated) dates from the Early Historic period, 10 are stratigraphically consistent. They range from 760-400 BC to 130-380 AD The Early Histroic settlement probably flourished from 400 BC to 300 AD.

Summarizing the importance of Balathal, Misra said:

"Balathal was a prosperous agricultural settlement. It produced enough agricultural surplus to make large man-power available for constructing the massive fortified enclosure and residential structures of stone, mud brick and mud. Unlike in other contemporary Chalcolithic and Neolithic cultures, the technology of the inhabitants was primarily based on copper tools rather than on those of stone. The presence of impressive public architecture and a large multi-roomed residential complex suggests a chiefdom society. Variations in the size and quality of residential structures suggest an economic and social hierarchy. The close similarity of the later (IB) phase of Balathal in architecture and ceramics with the Harappan culture of Gujarat suggests that the people of Balathal had close relationship with the latter and probably derived the inspiration of impressive public architecture, residential complexes, and Tan Ware from them" (1997: 272).

Dilip Chakrabarti has made an interesting observation on Balathal. According to him,

"The protohistoric chronology of Balathal has added a new, if not revolutionary, dimension to our understanding of the Ahar culture. The excavators rightly point out *c*. 2600 BC (uncalibrated) as the general period of its beginning, with the general dates of its middle and late levels being *c*. 2400/ 2300 BC (uncalibrated) and *c*. 1800 BC (uncalibrated), respectively. What they curiously fail to consider is the implication of the calibrated range of these three chronological points: *c*. 3300-2900 BC (calibrated), 2900-2600 BC (calibrated) and *c*. 2200-2000 BC (calibrated). There should not be any doubt about the beginning of protohistoric occupation at Balathal towards the closing centuries of the fourth millennium BC. This has three major implications. First, this is as early as the beginning of early Harappan occupation at Kot Diji, among other sites, and second, this is also as early as the beginning of Ganeshwar-Jodhpura culture of north-east Rajasthan. Third, the non-iron phase of the protohistoric occupation of the area continued till *c*. 2000 BC or a little later" (Chakrabarti 1999: 219).

Climate as a factor

Following an ecological approach is an important aspect of Misra's work, be it in Prehistory or

Protohistory (Misra 1976b, 1976c, Misra *et al*. 1979-80). In case of protohistory, he questioned palynologist Gurudip Singh's overall hypothesis (Singh 1971; Singh *et al*. 1974) that fluctuations in rainfall played a decisive role in the emergence, diffusion, prosperity and decline of Harappan Civilization in north-west India (Misra 1984). Tracing the intellectual pedigree of Singh's hypothesis to Aurel Stein and Marshall - who had proposed, on the basis of archaeological evidence in Baluchisthan and Sind, that climate in those regions during Indus civilization was wetter than at present. Misra also noted the difference between Singh's theory on the one hand and Aurel Stein's and Marshall's on the other, on three important aspects. First, Singh's evidence of climate was based on palynological rather than archaeological data. Second, climatic change consisted of several fluctuations covering the almost entire Holocene period in north-west India rather than being confined to the Harappan period. Third, the fluctuations in rainfall were related not only to growth and decline of the Harappan culture, but also to the emergence of agriculture-based life from the 8th millennium BC and its expansion in the 4th and 3rd millennium BC in north-west India.

Misra examined the four hypotheses proposed by Singh against the backdrop of the archaeological evidence. The first hypothesis visualized an increase in rainfall in the semi-arid and arid belts of Rajasthan around 8000 BC, leading to the emergence of cereal agriculture in north-west India soon after. Misra pointed out the total absence of archaeological evidence of pre-Iron Age agriculture over the vast expanse of western Rajasthan, outside the Ghaggar valley. Singh had given two reasons for this absence: one, lack of adequate field work, and two, the mounds or sites might have got buried under aeolian sand. Misra rejected both these explanations. Regarding inadequate fieldwork, he referred to his independent work since 1959 as well as that with Leshnik and Rajaguru *et al*. in north Gujarat, Luni valley, and over a large area further north, and as well as that of Allchin and her colleagues (Allchin *et al*. 1978) which have not given any evidence in support of Singh's hypothesis. About Singh's second explanation, Misra argued that there was no evidence of massive aeolian activity after 2000 BC that would have buried all old mounds under sand.

Increased rainfall around 3000 BC being a causative factor in the development of Harappan culture was the second hypothesis of Singh. In this regard Misra discussed four phases of Harappan culture, Early, Mature, Late, and Degenerate or OCP. If one would accept Singh's hypothesis, one would expect, Misra argued, to find a greater density of Neolithic-Chalcolithic and Harappan sites in the relatively less harsh west Rajasthan and north Gujarat plains than in the hyper-arid Cholistan. But the archaeological evidence is quite to the contrary. There is a high concentration of Harappan sites of the first three phases in the Hakra-Ghaggar system and total absence away from it in the desert. Hence increased rainfall was not a decisive factor in the rise and growth of Harappan culture. Rather any explanation for rise and fall of Harappan culture should take into account the fluctuations in the water regime of the Ghaggar-Hakra river. Singh's third hypothesis was that a decrease in rainfall around 1800 BC led to a decline of the Indus civilization. Misra accepted that there was undeniable decline in material prosperity and civic standards. However, such decline did not result in a decrease in population. On the contrary, what happened was a migration of population from the lower Indus valley into Saurashtra and from Hakra-Ghaggar valley into north Punjab, Haryana and the upper Yamuna-Ganga doab. The sudden proliferation of the Late Harappan sites in the latter areas implies such migration. Misra pointed out that at least in the cases of north Punjab and the upper Yamuna-Ganga doab, rainfall was not significantly higher than in the adjoining parts of Punjab and Haryana which were associated with dense human settlements during Early and Mature Harappan times. Therefore these new regions of colonization, Misra inferred, could not have conferred any significant advantages to the immigrants. According to him,

"On the other hand, the shift of the courses of the Yamuna and Sutlej to the east and west, respectively, would have considerably reduced the availability of both surface and subsurface water in the Ghaggar valley. This would, in due course, have adversely affected both natural vegetation and agriculture, and forced the population to shift to areas like north Punjab, Haryana and the upper Yamuna-Ganga doab where seasonal streams originating in the Siwaliks provided adequate water for agriculture and pasture. It is, therefore, quite unnecessary to invoke the deterioration of climate to explain this migratory phenomenon" (1984: 481).

The fourth hypothesis of Singh was that aridity between 2000 and 1000 BC was responsible for the cultural gap between the Harappan and the PGW cultures. Referring to the archaeological excavations at Bhagwanpura in Haryana, Dadheri, Nagar and Katpalon in Punjab, and Manda in Jammu, Misra pointed out that the PGW culture at these sites overlapped with the Late Harappan. And hence there was no hiatus. The evidences for such overlap, Misra asserted, "effectively knocks the bottom out of the desiccation hypothesis of Singh" (1984: 482).

Rock Art

One of the aims of Misra's work at Bhimbetka was to relate the rock art traditions of Central India (Misra 1981; Misra and Mathpal 1979, 1989) with archaeological contexts. Along with his excavation at III F-23 rock shelter, he also studied the main features of prehistoric rock art of Bhimbetka and supervised the Ph.D. thesis of Y. Mathpal (1984) who made a comprehensive study of the art. Misra (1981) pointed out three reasons as to why rock art study has not been emphasized by mainstream archaeologists. These include firstly, the location of prehistoric rock art sites inaccessible hilly and forested country and consequently difficulty of access to them; secondly the difficulty of dating the paintings and providing them a reliable chronology; and thirdly, the lack of the kind of varied cultural material one expects to find in an archaeological excavation. The reason for the concentration of cave paintings in central India, according to Misra, is 'purely geological', since the Vindhyan rocks in central India are formed of sandstone which weathers easily to form shelters. Paintings in Bhimbetka are found on cave walls and ceilings as well as in small hollows or niches formed by natural weathering of rock. Most of the paintings are in red and white colours. However, green and yellow colours are also occasionally used. The oldest paintings are the green ones since they are preserved only in fragments and occur at the base of painting sequence. The recovery of haematite nodules with ground facets in more than twenty hues from excavated habitation deposits implies their use in painting. The paintings were made by thin brushes, probably made of twigs. In the earlier phase the animal body was usually shown only in outline. However, in the later stages it was decorated with geometric patterns. Although animal and human figures are usually drawn in profile, greater realism is shown in the depiction of animal figures than those of humans. On the basis of superimposition and subject matter and style of the paintings, Mathpal and Misra have grouped them in nine phases. The paintings of Phases I-V belong to the Mesolithic period with hunting-gathering as primary mode of subsistence while those of Phase VI belong to the transitional period when the hunter-gatherers had taken to domestication of animals under the impact of the Chalcolithic agriculturists of the plains. The paintings of Phases VII-IX belong to the Historical period. According to Misra, Bhimbetka paintings of the prehistoric period are technically superior to, aesthetically more pleasing, and ethnographically more informative than the paintings of the Historic period. The most common subjects of these paintings are wild animals, and scenes of hunting, fishing, and food gathering activities. These paintings greatly supplement the knowledge derived from the excavations, throwing light on the economic, technological, religious and social life of the cave dwellers. The prehistoric art of Bhimbetka, Misra argued, is characterized by its closeness to nature, dominance of animal figures and hunting scenes, naturalism and vitality of animal body and representation of various aspects of hunting-gathering way of life.

Lack of painted rock pieces in stratified deposits and of associated organic materials suitable for radiometric dating are the two important handicaps in establishing an absolute chronology of the paintings. However, some attempts are being made by Robert Bednarik and his Australian scientist colleagues to date pigment samples from Bhimbetka.

Ethnoarchaeology

Talking about the pattern of human adaptations in the semi arid and arid zone of Rajasthan, Misra (1994a) explained the prevalence of the deep-rooted traditions due to 'certain environmental as well as historical factors'. According to him, while "the feudal background has contributed appreciably to the persistence of traditional ways of life in the desert regions" (1994a: 103), environmental conditions "impose severe constraints on economic growth and change which in turn contributes to the perpetuation of traditional adaptive patterns" (1994a: 101).

Misra stated two features about the communities in the desert zone. First, all the communities are interlinked by an intricate web of symbiotic economic and social relationships. Second, the

desert region is largely free from caste-based tensions and conflicts, unlike most other parts of India. As regards the settlement pattern, it is marked by small nucleated villages with a number of widely dispersed satellite hamlets or homestead clusters (*dhanis*). In Misra's view, "the pattern is a product of high per capita requirement of arable land which is dictated by low agricultural productivity due to the poor quality of sandy soils and scarcity of water" (1994a: 105). Usually people of one caste or lineage reside in a dhani. Regarding the nature of housing, while in the core or parent village richer farmers and traders live in houses made of stone, brick and mud, in the dhanis poorer farmers live in circular wattle huts with conical roofs.

As regards economic adaptations, the key feature in the arid zone, Misra argued, is the acute scarcity of water. Agriculture is a primary occupation, although because of low and uncertain rainfall, cultivation is largely confined to one harvest grown during the monsoon. The main crops are bajra or pearl millet, jowar or great millet, moth and til. In the eastern part of the dessert where well water is available for irrigation, the winter crops cultivated comprise wheat, barley, gram, pea, etc. Because of the excellent fodder grasses in the desert, even those who are primarily cultivators keeps some livestock, while communities like the Rebaris or Raikas and Banjaras are predominantly livestock breeders. Regarding crafts, the Chamars work in leather, a section of the Balais are engaged in the spinning of wool and weaving of carpets, blankets and shawls, and Gadoliya Lohars are itinerant blacksmiths. The Banjaras at one time were the traditional traders and transporters but with the development of modern means of transport have been reduced to trading in bullocks and working as labourers. As regards the communities providing entertainment, the Kalbeliyas are snake charmers, singers and dancers. Bhopas are priests and musicians, and a section of the Bhils specialize in narrating the ballad of Pabuji, a highly venerated Rajput hero. Besides, there are members of several castes offering professional services to other castes. The relationship between service caste and other castes is governed by the *aat* system in which each family of a service caste serves a group of families belonging to other castes.

Van Vagris or 'dwellers of the forest' (Misra 1990) are the principal hunting community of the desert. This group has not been mentioned earlier in any anthropological literature or in census reports. They live entirely by hunting which includes animals such as blackbuck, chinkara, nilgai, wild boar, fox, jackal, porcupine, and monitor lizard. They also trap and kill birds like partridge, dove, and pigeon. The hunting and trapping equipment of the Van Vagris consists of a muzzle-loading gun, *ranpi* or *kuso* (a wooden stuff with a rectangular iron blade), spear, *kudko* (metal trap), *jaal* (net), *pansa* (noose trap) and bow and arrow. They also use dogs. Their material possessions are very few and include a few aluminium and earthen pots for cooking, eating and storage of water, their hunting gear, a few donkeys for carrying their belongings, and one or two goats which are usually sacrificed to their goddess.

As regards gathering, the wild plant foods are consumed in a much larger measure by the settled peasantry than by the nomadic groups like the Van Vagri hunters, since most of these foods require, Misra explained, elaborate processing and cooking which the Van Vagris find too tedious to undertake. Besides the Van Vagris, nomadism - an integral aspect of the rural life in the desert - is particularly characteristic of pastoral communities, traders and certain service castes. However, the degree of mobility varies according to the nature of the occupation. Thus Misra's account "exemplifies the capacity of the desert population to develop a variety of economic and cultural adaptations to the ecological niches characteristic of the region" (1994: 124).

Misra also studied the survival of the hunting-gathering traditions in the Ganga plains and central India (Nagar and Misra 1990, 993, 1994). For the Ganga plain, data have been gathered from published, primarily colonial, sources except those on the Kanjars. On the basis of William Crooke's *Tribes and Castes of the North- Western Provinces and Oudh* (1896), two groups relevant for Misra's study, were (1) Hunters, Fowlers etc. and 'Miscellaneous and Disreputable Livers". Crooke's list included among hunters and fowlers, groups such as Aheriya, Baheliya, Bandi, Bangali, Gandhila, Gidiya and Kanjar. The miscellaneous and disreputable livers with some degree of hunting-foraging activities were the Badhik, Bawariya, Bhantu, Habura, Sansiya and Siyarmar. Both the groups practised hunting-foraging and, in some cases, fishing but the second group had acquired a notoriety for their indulgence in crime. For example, the Aheriyas catch snakes and roast and eat them, while the occupation of the Baheliya

is described as hunting, bird trapping and collection of jungle produce. The Bandi, like the Baheliya, are basically bird catchers. The Bangali eat the flesh of cloven or uncloven footed animals, fowls, fish and crocodiles. The Gandhila eat squirrels, quails, tortoise, dogs, etc. The Kanjar subsist by hunting jackals, wolves, etc., trapping birds and squirrels, digging out snakes, etc. From colonial ethnographic sources, not much information is available on technology and techniques of hunting. However, the major tool and weapon of the Kanjar is Khanti or Khanta which serves as a dagger or short spear for killing wolves and jackals, as a spade for digging snake etc. out of their holes, for digging edible roots, and as a hatchet for chopping wood. The Kanjar hardly use bow and arrow. Rather they use gulel (pellet bow or sling) which requires much greater skill. The Baheliya use a very ingenious mode of trapping birds with a series of thin bamboos, like a fishing rod, on which bird-lime lasa is smeared. All the communities also exploit wild plants, and some of them like Kanjar also collect honey.

From central India, Nagar and Misra (1994) discussed two semi-nomadic communities, the Pardhis and Kuchbandhias who usually have a permanent home base away from peasant villages where they live during rainy season. These settlements consist of small huts made of stone walls with thatched roofs. During the rest eight months of dry period, they are on the move and camp in the forest either in the open or in small, flimsy huts. The division of labour is known from the fact that men and grown up boys go for hunting while women go to the villages to sell various items to village women. About 5 to 10 families, related to each other by blood or marriage, live in a temporary camp which is moved every few weeks. The Pardhi carry their goods either on bullocks or bullock carts while moving the camp while the Kuchbandhia use public transport. As regards social organization, both Pardhi and Kuchbandhia are divided into a number of exogamous clans with nuclear family as the typical type. Polygamy is fairly common and the panchayat or community council is strong. Both the communities bury their dead.

Hunting is the primary occupation of the males of both the communities. They hunt a wide variety of animals such as wild boar, chital, and sambhar. The hunting implements of the two groups include ballam (spear), phandi or tantla (a large trap made up of multiple nooses), mangri, khandari, kudka, etc. Trained dogs are also used in hunting. Small balls of explosive powder are used for killing wild boar.

Situating V. N. Misra in Indian Archaeology

It is surprising, rather disappointing, that despite more than 200 years of history of archaeological research, India's case is hardly emphasized in general discourse of archaeological theory. Yet, right since colonial period there are interesting theoretical issues in Indian archaeology. Very briefly one could state that the colonial approaches had various strands - such as Orientalism (for example Sir William Jones), Utilitarianism (i.e. James Mill), Romanticism, and Hegelian idealism (Mitter 1977) sometimes complementing and sometimes competing with one another. While the Orientalist and romanticist approaches lauded India's past, Mill had a disparaging attitude to India's heritage. Thus the colonial approaches were not a monolith. The nationalist school of historiography grew from the late 19th century. However, it is interesting to note that the nationalist historians and archaeologists incorporated in their framework the sympathetic attitude of Orientalist and romanticist scholars on the one hand, and the periodization of Indian history by James Mill on the other. The main difference between the colonial and nationalist approaches was the following: Despite differences, the colonial approaches as a whole, gave legitimacy to the colonial rule either in an explicit or implicit manner. On the other hand, the nationalist historiography in general provided an intellectual background to challenge the colonial rule in India. During the post-colonial period, archaeology has been taught in a number of universities and archaeological research has been carried out in these centres, in addition to the work of Archaeological Survey of India - the latter said to be the biggest state funded archaeology department in the world.

An important fact to be borne in mind is that while archaeology is primarily a part of historical tradition in Britain and of anthropological tradition in the United States, India provides a combination of both the traditions. From 1940s onwards, especially after India's independence in 1947, much emphasis was given to the study of prehistory. Emphasis on the discovery of Harappan sites in India was another important feature during the post-colonial period since the most well-known

Harappan sites like Harappa, Mohenjodaro and Chanhudaro, went to Pakistan. One basic purpose of laying stress on prehistoric researches after independence could be the attempt to trace back the antiquity of human culture on a scientific basis coinciding with the Nehruvian scientific temper. Thus, emphasis on ecology and reconstruction of past environment as a background for studying prehistory became an important aspect.

Although there arose a general awareness about environmental reconstruction for Indian archaeology only during the second half of the twentieth century, attention was paid to geographical factors by some nineteenth century archaeologists working in India (Chakrabarti 1988b: 50-64, for general review see Paddayya 1994). While Cunningham adopted a topographical approach, Robert Bruce Foote, the father of Indian prehistory, sought to correlate the distribution of archaeological sites with geographical features and Sir Aurel Stein collected much information about natural features of sites and areas studied by him in the north-western part of the subcontinent. Subsequently, F.J. Richards wrote on the geographical factors in Indian history followed by Spate's famous book on regional geography of India where he talked about 'major geographical lineaments of Indian history' (i.e. Delhi-Aravalli-Cambay axis and the Vindhyan divide) and the 'perennial nuclear regions' (such as the Peshwar and Potwar valley, Punjab plains, and the Panchala region in the Ganga Yamuna doab). Influenced by Cyril Fox's work in Britain and improving upon Richards and Spate, Subbarao (1958) divided the Indian subcontinent into three regions in terms of their relative importance in Indian history and archaeology; (a) nuclear regions or areas of attraction (the Punjab, the Indo-Gangetic divide, Malwa, Maharashtra, Karnataka and Tamil Nadu), (b) areas of relative isolation (Sindh, Marwar, Gujarat, Saurashtra, Konkan, Kerala and Assam), and (c) areas of isolation or cul de sac (the Aravallis, the highlands of central India and other hilly and forested areas now inhabited by tribal populations). Although subsequent fieldwork has somewhat altered the relative positions of some regions to archaeological record, Subbarao's division broadly holds good. The basic value of Subbarao's postulate, according to Chakrabarti "is that it gives a geographical framework to understand the multilineal process of cultural development in Indian history and archaeology" (1988b: 52). A broad geographical approach has also been followed by various scholars in writing the archaeology of the subcontinent. It was Sir Mortimer Wheeler who in 1946 lamented that "there have been archaeologists and anthropologists in this country, but no coherent science of archaeology and anthropology had ever been established" (1946: 125) and hence made a passionate plea to employ natural sciences as a regular component of research. In an appropriate manner, F.E. Zeuner of the Institute of Archaeology, London was invited by H.D. Sankalia of Deccan College, "to study the implement-bearing strata, which had been found mainly in the valleys of the rivers, to establish their topographical affinities and their geological context, and, if possible, to arrive at a chronology of the earliest evidence of the presence of man in this part of India" (Zeuner 1950: 1, 1951, 1963). However, prior to Zeuner, in the first Palaeolithic excavation in India at Kuliana in Orissa by the Culcutta University, Bose and Sen (1948) tried to reconstruct the environment and geo-chronology on the basis of the occurrence of palaeoliths in association with laterite, an aspect further extended by A.K. Ghosh (1966,1970). Reconstruction of past environment and its relationship with prehistory has been the focus of some important interdisciplinary researches in the last two decades - in Rajasthan (Misra 1987a, 1987b), Rajasthan and Gujarat (Allchin *et al.* 1978), Kashmir valley (Agrawal 1992) and the Son valley, Madhya Pradesh (Sharma and Clark 1983). Moreover, for reconstruction of environment emphasis has been given on geomorphology and palaeoenvironment (Joshi 1970, Rajaguru and Korisettar 1987; Pappu 1974, 1985; Pappu and Deo 1994), palaeontology (Badam 1979), animal remains (Thomas 1974), plant remains (Fuller 2002; Kajale 1996; Vishnu-Mittre 1990) and palynological studies (Singh 1971).

Seen against this background, Misra's interdisciplinary work for reconstructing the climatic history of Rajasthan is a continuum. There are four aspects of Misra's ecological approaches. First, as has been stated, ecological background was an important aspect of Misra's prehistoric research. Second, for reconstructing the past environment, he depended on multidisciplinary research, such as geomorphology, sedimentology, palaeontology, archaeozoology and archaeobotany. Third, Misra emphasized adaptation to local environment in his study of prehistoric cultures. Last but not the least, despite his emphasis on

ecology, Misra, unlike Dhavalikar, did not resort to what may be called the ecological determinism. Incidentally, Dhavalikar has used environment as the determining factor for the rise and fall of the Chalcolithic culture at Inamgaon (for a critique, see Paddayya 1994). For Misra, however, ecology constrains but does not determine cultures. Besides, Misra, like Grahame Clark, emphasized on Mesolithic culture, and like Grahame Clark, adopted the ecological approach to Mesolithic culture.

There are four main aspects of his study on protohistory. First, like prehistory, he critically discussed the role of climate as a factor in the rise and fall of Harappan civilization. Second, on the basis of his excavation at Bagor, he could show the interaction between metal using agriculturalists and lithic tool using hunter-gatherers. Thus, the cultural unevenness of the complex heritage of India is traced to a remote past. Third, his excavation at Balathal has thrown important light on the Chalcolithic culture in general and of northwest India in particular. Fourth, he also discussed the role of Rigvedic Sarasvati in relation to the Indus Civilization (1994b, 2001b). In this regard, he highlighted two aspects. Firstly, he compared the distribution of Harappan sites on the Indus river and on the dry channel of the Ghaggar-Hakra river. Secondly, on the basis of archaeological, geomorphological, sedimentoogical, remote sensing, literary and folkloristic data, Misra inferred that both the Sutlej and the Yamuna flowed in the Sarasvati channel in the past. He pointed out that the literary references including those in the Rigveda with regard to the location, size and desiccation of the Sarasvati river closely match with the features and history of the Ghaggar-Hakra river.

Let us now try to situate Misra in the ethnoarchaeological researches in India. The importance of ethnographic accounts on the bewildering diversity of tribals in the Indian subcontinent for archaeology was realized by scholars like James Fergusson and Alexander Cunningham from the nineteenth century (Allchin 1994b: 5). The tradition was continued in the early part of twentieth century by Marshall, Mackay and Ananda Coomaraswamy. Thus archaeologists in South Asia generally resort to what Bridget Allchin calls spontaneous ethnoarchaeology. Writing in 1923, P. Mitra mentioned that prehistoric archaeology and ethnography are two branches of science and are complementary to each other (Mitra 1979: 141). He thought that the Andamanese whose stone implements could hardly be distinguished from prehistoric implements, perhaps perpetuate directly a culture predominant in the Indian peninsula in Pleistocene and possibly earlier times (1979: 14-15). However, it was Furer-Haimendorf who categorically mentioned that “it is the knowledge accumulated through the detailed study of contemporary primitive cultures, which supplements the data and breathes life into fragments brought to light through the spadework of the archaeologist” (Furer- Haimendorf 1943: 1). Later, he went further in stating that the Chenchus are still living in ‘palaeolithic style’, the Reddies in the ‘neolithic’ and the Bondos and Gadabas in the late ‘neolithic’ stage (Furer-Hamendorf 1948). Subbarao pointed out that the archaeologist draws heavily on ethnology and uses the knowledge gained by the study of the life and behaviour of living communities - particularly of people who are historically backward and in earlier stages of civilization (1962: 127). Speaking of the urgency of ethno-archeological research in general, Longacre has opined that “if we and our students do not undertake ethno-archaeological research soon, future archaeologists would wonder how we could have been so short sighted” (1991b: 10). For Thompson (1991) the key feature of an ethnoarchaeological work is that it is done for ‘an archaeological purpose’. However taking ‘a very broad definition of the field’ Sinopoli in her review of South Asian ethnoarchaeology included not only explicitly ethnoarchaeological studies, but also “ethnographic studies that have focused on material culture, without necessarily being concerned with its archaeological implications” (1991: 178).

Regarding hunter-gatherers in anthropological literature, Bettinger (1991) referred to two general models. The first, the developmental model regarded hunter-gatherers as primitives and, culturally backward groups capable only of simplest undertaking. The heart of the model is progressive social evolution from less to more advanced forms. Hunter-gatherers are portrayed as disadvantaged and backward folk, in essence, fossils from an earlier stage of human evolution. The second, the ecological model reverses the logic of the earlier model of hunter-gatherers as underpriviledged. On the other hand, laying stress on adaptation and homeostasis, the second model treats the hunter-gatherers as an advantaged and, in their own way, sophisticated folk who made the

leap to agriculture only when circumstances beyond their control irrevocably upset their traditional ways of life.

Considered from the broad perspective of Sinopoli, Misra's ethnographic studies in Rajasthan, Ganga valley and central India may also be regarded under ethnoarchaeology. There are six aspects of Misra's ethnoarchaeological research. First, as regards methods, he did fieldwork among various ethnic groups, in particular hunter-gatherers, resorting to anthropological methods of participant observation and questionnaire. He also followed the archival methods by studying colonial writings on the hunter-gatherers of the Ganga plain. Second, he regarded the contemporary hunter-gatherers in India as descendents of prehistoric communities and in that sense, he followed the direct historical approach in ethnoarchaeology. Third, he also drew our attention to several ethnographic examples of hafting of microliths in suitable shafts from various parts of the world and thus, emphasizing the importance of ethnographic studies in the functional interpretation of prehistoric tools. In that sense, he followed the general comparative approach in ethnoarchaeology. Fourth, he also discussed the process of incorporation of tribal societies into caste society with the help of archaeological and ethnographic data (Misra and Nagar 1997). Fifth, Misra not only discussed the hunter-gatherer communities in the hilly region which is usually done by ethnoarchaeologists, but also laid stress on their survival even in the plains by his study in the Ganga plains. Sixth, the persistence of traditional communities is, Misra argued, because of both ecological adaptation as well as historical factors.

It is relevant here to mention two general points made by the social anthropologist Surajit Sinha about hunter-gatherers. Firstly, while discussing the 'Multiple scales and networks' of Indian civilization, Sinha (1978) discussed two levels of hunter-gatherers in India. The hunters of the Andaman Island remained isolated until recently, and hence were branded by Sinha as primitive. On the other hand, hunters on the Indian mainland are at a 'symbiotic' level, since they maintain a regular contact with the settled peasantry in the neighbourhood (1978: 125). Secondly, the hunting and gathering mode of subsistence by the tribals of the Indian mainland, according to Sinha, is a case of 'secondary primitivization' or 'devolution', since the encroachment of the caste-based economy and extensive deforestation forced many of the tribal swidden cultivators of the hill slopes in central-east India (for example, the Birhors and Hill Khadias) to specialize in hunting and gathering (1969: 164). In other words, hunting and gathering, which was a subsidiary mode of subsistence, became the primary one in course of time (Adhikary 1989: 15). Understood in this perspective, Misra's view is contrary to that of Surajit Sinha with regard to the hunter-gatherers of the Indian mainland.

Theoretically, diffusionism was an important mode of explaining culture change in Indian archaeology even a few decades after independence. One could talk of two kinds of diffusionism. The first was the Irano-centric (or West Asia-centric) diffusionism of H.D. Sankalia (1974, 1975-76) who argued that just as in historical times, India was colonized in prehistoric times as well. Such process of colonization was initiated, according to Sankalia, from the region of Iran and countries further westwards though he also mentioned Southeast Asia as another region influencing the Neolithic culture of northeast India by its polished and ground axes as well as rice (1974: 3). The second was the modified diffusionism of Sir Mortimer Wheeler who emphasized that "ideas have wings and more liable to flit airily about our prehistoric as about our historic landscape, with a baffling intangibility or disguise" (Wheeler 1952: 185), because "it takes a million years to develop a species, perhaps a million seconds to develop an idea" (1952: 187). Thus Wheeler argued for diffusion of ideas and not necessarily mass migration. Against this diffusionary framework Chakrabarti (1976) argued for a case of indigenous evolution especially for the iron age. From late 1960s onwards New or Processual Archaeology, which had developed in United States and Western Europe primarily by the 'Bin-Clarke' school had its impact on India. However such application of New or Processual Archaeology in India was not necessarily a replica of the Western viewpoints. This becomes explicit when one compares and contrasts the works of three Indian archaeologists - S.C. Malik, H.D. Sankalia and K. Paddayya.

Malik is possibly the first Indian archaeologist to talk in terms of a processual archaeology in India influenced by Radcliffe-Brown's structuralism and Robert Redfield's anthropological works on India. Malik's concept of processual archaeology is different from that of Binford in a number of

aspects. Firstly, unlike Binford who talked of hypothetico-deductive method, Malik did not reject inductive method. Rather he seems to have accepted it (1968: 54, 61). Secondly, unlike Binford, Malik accepted the limitation of the nature of archaeological data. Thirdly, he also accepted the relative nature of archaeological knowledge when he argued that every society interprets the past in terms of its 'perceptual, conceptual and metaphysical reproduction of the external world'. Fourthly, an important limitation of Processual archaeology is the ignoring or making a caricature of history by overemphasizing adaptation and neoevolution. Malik no doubt emphasized a 'social science' or 'anthropological' approach to archaeology, but he did not ignore history. On the other hand, he considered it 'more fruitful' to have 'a combined historical and anthropological approach'. Although Malik called for a processual archaeology in India, he appears to include themes which were to be raised later by postprocessual archaeologists in the West. In this sense, sometime it becomes difficult to label him for something at the cost of the other. For example, he considered structuralism in his discussion on Indian civilization. While he spoke on the importance of ethnoarchaeology (1968: 34-35) and thought of the 'regional cultural continuities' in terms of 'the cultural-ecological and processual explanation' (1968: 164), he also visualized the prevalence of the caste system in Harappan society by arguing for 'a very early beginning' of one of the most important social institutions of later India 'that characterize Indian style' (1968: 107).

Thus Malik emphasized reinterpretation of archaeology in an anthropological perspective, but he did not use it any fieldwork. For Sankalia (1977), on the other hand, New Archaeology was a set of techniques and methods to tackle problems in the field. Sankalia was not, especially while discussing New Archaeology, theoretically as much rigurous as was Malik. Thus one could say that the strength of Malik was the weakness of Sankalia and vice-versa. It is to the credit of Paddayya that he combined a strong theoretical outlook (like Malik) with an intensive field work (like Sankalia) in south India. He has made significant contribution not only writing on Processual Archaeology as a whole, but also in terms of making comprehensive reviews on their application in India - ethnoarchaeology, site formation processes, middle range theory, etc. An important dimension of his fieldwork is that he has spent most of his life in one single region to understand the archaeological complexities in a multi-disciplinary manner. His application of settlement system perspective for understanding the Acheulian culture of Hungsi valley is certainly a milestone in Indian prehistory. In his small but useful monograph (1990) he refuted the allegations against processualism. But unlike Binford, his optimism was not euphoric, rather cautious since he highlighted the 'limited but fundamental task' achieved by the Processual Archaeology. However, while Malik and Sankalia emphasized the specificity of Indian situation or tradition even in their general acceptance of the Processual or New Archaeological framework, for Paddayya the adoption of the 'recent trends' in the West, implying Processual Archaeology 'is the only way' to overcome the shortcomings in Indian archaeology.

With this background, let us now situate V.N. Misra who has been an eclectic as far as theory was concerned. For example, he considered both diffusion and evolution as factors of culture change. As far as New or Processual Archaeology is concerned his perception was closer to Sankalia than to Malik or Paddayya. Three features characterize Misra's archaeological research with regard to New Archaeology. First, he emphasized on adaptation to contemporary environment by prehistoric man. Second, he conducted ethnographic research to provide flesh to the dry bones of archaeological data. Third, he also used quantitative methods in his prehistoric studies. Such anthropological perspective is partly because of his background in anthropology from Lucknow University and partly because of the emergence of Processual Archaeology which considered archaeology as anthropology.

However, there is an imprint of historical tradition in Misra's work also. For example, his work on Berach basin could be broadly categorized under culture history in framework. He has also excavated early historic remains from Balathal and Kopia. According to Misra, history is the "story of entire people inhabiting a country or a region. It is the story of their struggle against their environment to liberate themselves from its hold and conquer it for their material, social and moral uplift. In this notion of history individual figures whether they be kings or military heroes, priests or philosophers, religious leaders or scientists, become less important, for these figures are after all creations of

the cultural conditions prevailing in the society at any given period. These conditions are the creation of the society as a whole. It is only against the background of the culture of the society that the achievements or contributions of individual persons, however great, can be understood. Thus it is the society or, more precisely, the culture of the society which became the proper subject of historical study. This change in the scope and meaning of history is in a great measure due to the important role which archaeology is increasingly playing in the reconstruction of the past" (1974: 8-9).

Misra also compared and contrasted between history and archaeology. In comparison to the written records of history, archaeological record, according to Misra, is 'essentially imperfect' since it consists of the surviving material remains of the past. On the other hand, the advantages of archaeology over history are, Misra argued, twofold - the objectivity and anonymity of the former since archaeology "concerns itself with the achievements and failures of the society as a whole and therefore provides us with the most democratic form of history" (1974: 12).

To conclude, Misra contributed significantly to prehistory, protohistory, ethnoarchaeology and rock art study. Like Sankalia, fieldwork has remained a hallmark of his career and like Grahame Clark he applied ecological approach to prehistory in general and Mesolithic in particular. Theoretically eclectic, he followed ecological, ethnoarchaeological and quantitative approaches as far as anthropological tradition of Indian archaeology is concerned. However, he has not ignored history either, and in that sense, he has been conscious of both the anthropological and historical traditions of Indian archaeology. He is not parochial at all. For example, while emphasizing prehistoric rock art of Bhimbetka and other sites of central India, Misra stated,

"It is not the heritage of a particular community, race or religion. It belongs to a stage of cultural evolution when the ancestors of all peoples in our country were leading a hunting-gathering way of life. It is, therefore, the common heritage of the entire Indian society" (1981: 16).

Perceived in this light, Misra appears to be a secular nationalist. Thus, in this paper, a modest attempt has been made to situate V.N. Misra in Indian archaeology in a historiographical manner. Similar study on other Indian archaeologists, both belonging to the colonial and post-colonial periods, is a need of the hour. This would enable us not only to explore the creative engagement of Indian archaeologists with the archaeological theory and data, but also would, hopefully, strengthen the cause of archaeological discourse in our country in such a manner that, like the Indian market in the present international economy, Indian archaeology will not remain peripheral to the general archaeological discourse in the world in an era of globalization.

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A Morphometric Study of the Palaeolithic Industries of Bhimbetka, Central India.

Md. Shafiqul Alam

Introduction

Prehistoric research in India began almost simultaneously with the epoch-making discoveries in Europe when a Neolith was picked up by Medows Taylor from Lingsuar in 1840 (Varma 1997). But this research got its strong foundation with the discovery of a cleaver, an Acheulian implement, in a laterite gravel pit at Palavaram near Madras in 1863 by Robert Bruce Foote of Geological Survey of India (Foote 1866). Encouraged by this outstanding discovery Foote made a strenuous explorations in various parts of Peninsular India during the following four decades during which time he discovered a large number of prehistoric sites and collected huge lithic artefacts. Moreover, he has catalogued those finds and published detailed reports in two volumes (Foote 1914, 1916). Foote was followed by his colleagues and other scholars like Rivett-Carnac (1884), Cockbum (1888) and Cogin Brown (1917) who reported stone tools from various parts of India.

But the enthusiasm with which Foote had started the work could not be kept up by his successors and went on sluggishly till 1930 when it received a new impetus. Cammiade, Richards and Burkitt were engaged in South India, while Todd, Wadia and De Terra worked in the Pindi Gheb region and the Himalayan foothills. In 1935 the Yale-Cambridge mission visited India under the leadership of De Terra and H. Patterson. It was another landmark in Indian Prehistory. Their extensive expedition in the Himalayan foothills, Central India and Peninsular India revealed a new Palaeolithic culture known as the 'Soan' at the Patwar region of Rawalpindi in the north-western part of the Indo-Pakistan subcontinent. It also provided a geological base and for the first time put the archaeological material in its proper geological perspective (De Terra and Patterson 1939). The clues left by Foote and the Yale-Cambridge Expedition were taken up by V.D. Krishnaswami, H.D. Sankalia, Todd, Bose and Sen, V.N. Misra (1978,1982), S.N. Rajaguru, M.L.K. Murty and K. Paddayya, Sharma and Clark and so on It is interesting to note that before 1940 the prehistoric investigations were in the hands of government agencies like the Geological Survey of India and the Archaeological Survey of India. But after forties the situation was changed. The major investigations were carried out by several universities like Poona, Allahabad, Calcutta, Guwahati, Banaras, Vikram, Ujjain, Sagar, Andhra, etc. These studies provided a clear picture of the geographical distribution, stratigraphic relation, environmental setting and faunal association of the various Palaeolithic, Neolithic and Mesolithic cultures throughout the country. In addition several officials notably Lal, Joshi, Sarker, Sabramanyam, Banarjee, Dasgupta, of the Archaeological Survey of India carried out prehistoric investigations in various parts of India. Some of the state Departments of Archaeology also contributed their share, and special mention may be made of Rajasthan, Madhya Pradesh, Uttar Pradesh and West Bengal in this connection.

But the early prehistoric works were largely confined to the exploration of geological contexts like coarse alluvial sediments, stream beds and surface occurrences and their main objective was to discover the stone age remains in various parts of the country which until then were largely *terra incognita*. By the mid sixties, the sequence of prehistoric cultures, their geographical distribution and stratigraphic relation had become clearly known. The emphasis then was shifted to the discovery and excavation of relatively undisturbed or primary sites in order to recover the homogenous stone industries and understand the typological composition and technological changes in time and space, reconstruct the nature of hominid activities, study the strategies for the utilization of land water, plant and animal resources, reconstruct palaeo-environment of prehistoric societies and establish regnal of stone age sites by radiometric methods in order to build up a firm chronology. Considerable progress has been made in all these areas in last few decades.

However, the approach of most of the typological and technological studies of stone industries carried out has been subjective. Objective quantitative approach which is essential for accurate measurement of variability in space and time has been applied only in a few studies (Ghosh and Roy 1964; Ghosh 1966; Ghosh and Choudhury 1989; Misra, V.N. 1967; Misra, V.N. *et al.* 1987; Jayaswal and Pal 1973; Jayaswal 1978; Joshi 1976; Joshi and Marathe 1977; Semans 1981; Raju 1981, 1985, 1988; Misra, V.D. *et al*. 1983a, 1983b;

Kenoyer and Pal 1983; Blumenschine, Brandt and Clark 1983; Sinha 1984; Marathe 1985; Gaillard *et al.* 1985, 1986; Pant 1985; Gaillard and Murty 1988; Kumar 1989). Secondly, most of the assemblages so far studied are from secondary geological contexts such as gravel deposits or from river beds and surface exposures which may have been disturbed by natural and/or human agencies. Only a few are from primary or semi-primary contexts. Thirdly, the assemblages have been defined on small samples and in most of the cases on a few tool types or single cultures. There are hardly any excavated sites with successive Palaeolithic and Mesolithic cultures which can give an insight into the precise nature and trend of temporal variation in the assemblages.

Although a Middle Palaeolithic culture has been recognized in India at least for thirty years (Sankalia 1956), its definition is based largely on typology rather than on stratigraphy (Corvinus 1968). It has to be based on more precise morphological attributes, metrical variables and on stratigraphy. Also the technological distinction between the Lower and Middle Palaeolithic periods needs to be more clearly defined.

In this situation the cultural materials recovered by V.N. Misra from rock shelter III F-23 at Bhimbetka, Central India in a stratified and primary context with succession from Lower Palaeolithic to Mesolithic phase offer an ideal opportunity to carry out a detailed analysis of tool kits for understanding the temporal changes in various aspects of lithic assemblages from one stage to another (Misra, V.N. 1978a, 1978b, 1985).

The location of this rock shelter lends an unique importance to the site. The geomorphic setting of the site on a hill top, about 650 m above MSL precludes the operation of any fluvial agency in its formation. Thus no significant disturbance which is very common in most of the sites in India has taken place here. This is the only excavated site in India which has yielded a long continuous succession from Lower Palaeolithic period to Mesolithic period in a primary context. In view of these facts and the large volume of data from the shelter, it was decided to carry out a detailed study of the morphological attributes and metrical variables of the lithic artefacts from the shelter by quantitative approach.

The study is confined to the Palaeolithic period only. Though equal importance has been given to all the Palaeolithic periods, yet the small size of sample in the Upper Palaeolithic restricts the scope of study of variability in artefacts in this period. The objectives of the study are as follows:

i. To measure the detailed typological variability within and between the cultural periods.
ii. To assess the detailed technological variability within and between the cultural periods.
iii. To understand the detailed functional variability within and between the cultural periods.
iv. To judge the stylistic variation within and between the cultural periods.
v. To understand the formation of archaeological record at the site.

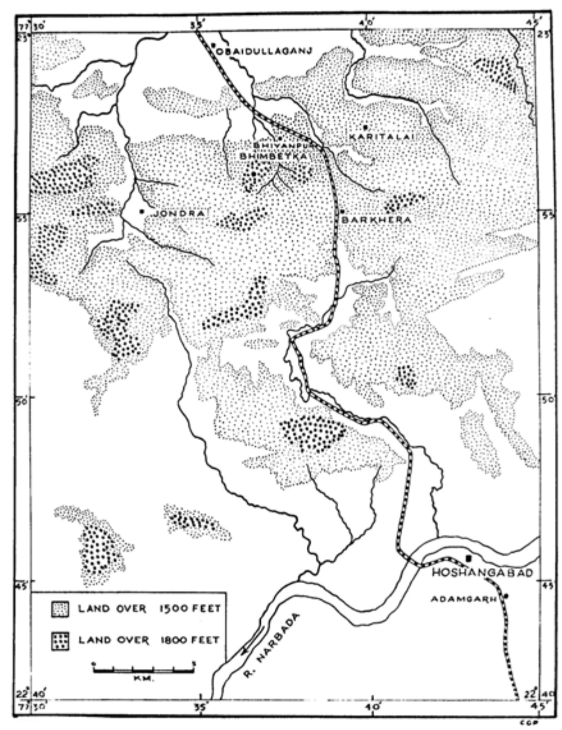


Fig. 1: Bhimbetka and its environs (*after* Misra 1985)

The site

Bhimbetka (22° 55'- 22° 56' N: 77° 36' -77° 37' E) is the name of a small hill on the northern margin of the Vindhyas in the Raisen district of Madhya Pradesh. It is situated 2 km southwest of Bhianpur, a tribal hamlet 45 km south of Bhopal and 30 km north of Hoshangabad between Obaidul laganj and Barkhera stations on the Central Railway (Misra 1978). The highway from Itarsi to Bhopal runs parallel to the railway line and passes close to Bhianpur (Fig. 1). The Bhimbetka hill is connected to the highway by a link road from Bhianpur. On

the top and slopes of this hill there are over 200 shelters of varying sizes. The majority of these shelters contain on their walls and ceilings paintings depicting scenes in the life of prehistoric hunter-gatherers and later agricultural societies as well as scatters of microliths on the floors and outside the mouths of these shelters. A small number of shelters also contain habitation deposits on their floors.

Physiograpy

Bhimbetka hill rises over 600 m above the MSL and over 100 m above the valley floor (Misra, V.N. 1978a, 1978b). It runs east-west for a length of 1 km and roughly 0.5 km north-south. Its eastern and southern slopes are steep while northern and western slopes are gentle. The hill is topped by a chain of dissected monolithic blocks which are eroded remnants of a former continuous rock mass. From a distance these rocks look like a medieval fort and form the most prominent landmark in the local topography. As many as 181 rock shelters have been formed at the base of these rocks as well as on the slopes of the hill. Two other adjoining hills known as Lakha Juar and Bhaunrewali, to the west and east of Bhimbetka respectively, are equally rich in rock shelters. These three hills together contain 642 rock shelters in a stretch of about 10 km between the villages of Karitalai in the north-east and Jondra in the south-west. The shelters have been divided into seven groups, I, II, II, etc. from east to west. Each of these groups has been further divided into sub-groups like A, B, C. Within each sub-group the shelters have been numbered in Arabic numerals. These three tiered numbers (for instance III F-23) have been put in Indian black ink on the walls of the shelter.

Bhimbetka and the valley on its southern side are thickly covered by deciduous forest. But on the northern side where several villages are located, the hill slopes are completely barren, due largely to the prolonged and continual cutting of trees for timber and fuel. This deforestation has led to extensive deflation of surface soil resulting in bare rocky slopes.

At the northern foot of the hill there are three perennial springs known as Ban Ganga, Gupta Ganaa and Pandapur. These probably served as water holes during prehistoric times just as they do today. There are no perennial streams in and around Bhimbetka. Several ephemeral streams originating on either side of the hill drain into the Narmada in the south and the Betwa in the north.

Geology

Geologically the basement complex of the hill is represented by Vindhyan sandstone and associated rocks. The sedimentary sandstones show ripple marks, sun cracks and current bedding or cross laminations as evidence of shallow water deposition (Wadia 1966). The sandstone is slightly metamorphosed and is designated as ortho-quartzite. The common colour of the rock is milky crimson, but there are bands of many shades from Clark purple through light brown to milky white. The outer colour of the rock is changed into blackish terra-vermilion due to growth of moss on its exposed surfaces. Weathering and accumulation of dust have changed the eroded surface of rock to sienna and orange. The horizontally bedded layers are interspersed with white bands.

Through the course of geological time the rock has suffered extensive erosion. Sun, rain, wind, changes in temperature, percolation of acids into the rocks and penetration of tree roots have contributed to the loosening and breakup of the rocks. The differential weathering of these sand stones has led to the formation of an array of natural cavities and rock shelters of various shapes and sizes which were ideal for hominid occupation.

Climate

Climate of this area is of tropical monsoon type. The area receives an average annual rainfall of 1200 mm which is mainly contributed by the south-west monsoon during July to September. In the remaining months it rains only 30 to 70 mm. Winter starts in October and ends in February. January is the coldest month characterised by chilly winds. From February temperature begins to rise and reaches its peak in May. Summer days are hot and dry.

Flora

Bhimbetka and its adjoining hills are covered with dense deciduous vegetation. About thirty species of herbs, shrubs and trees in the forest have edible flowers/fruits and seeds and some species have roots and tubers (Misra, V. N. 1978a, 1978b, 1985). Among the former, the more important are: Mahua *(Madhuca latifolia* Roxb), Achar *(Biiclian.nnia latifolia* Roxb), Tendu *(Diospyro tomentosa* Lam), Bel *(Aegle marmelos* Corr), Bhandara *(Erytherina indica* Lam), Jamun *(Eugenia fambolaha* Lam), Am *(Mangifera indica*

Linn), Gular *(Ficus glomerata* Roxb), Anola *(Phylanthiis. emblica* Linn), Ber *(Jizyphiis fujiibn* Lamk) Imli *(Tamarindus Indica Linn)*, Khajur *(Phoenix sylvestris* Roxb), Sitaphal *(Anona squamosa* Linn). Among tubers more common are Safed Musli *(Chlorophytuns arudiesacum* Baker), Potia Kand, Karahari kand and Khalulua. Even today the local aboriginal people extensively exploit these forest foods, specially Mahua and Achar, particularly during summer months.

Fauna

Many species of wild animals were noticed by the excavators (Misra, V.N. 1978a, 1978b, 1985; Mathpal 1978) during the excavation period. They are sambar *(Cervusulinicolour* Kerr), chital *(Axis axis* Erleben), blackbuck *(Antilope cervicapra* Linn), nilgai *(Boselaphus tragocamelus* Pallas), wild boar *(Sus scrofa cristatus* Wagner), hyena *(Hyaena hyaena* Linn), leopard *(Panthera pardus* Linn), wolf (*Canis lupus* Linn), sloth bear *(Meluruis ursinus* Shaw), porcupine *(Hystrix indica* Kerr), hare *(Lepus nigricollis* F. Cuvier), fox *(Vulpes bengalensis* Shaw), jackal (*Canis aureus* Linn), and common langur *(Presbytis entellus* Dufresne). Many kinds of birds, reptiles, including python *(Eryx johnii)* and insects are found. Elephant, lion, gaur/ and wild buffalo are depicted in the rock paintings which indicates that they were in the forest but have since disappeared.

Shelter, water, food (both animal and plant) and raw material, for making tools, which are basic needs of hunting and foraging communities were all available at Bhimbetka. That is why hunter-gatherers rightly selected this place and occupied the shelters from Acheulian times up to Early Historic period.

History of Research

The site was discovered by the late V.S. Wakankar in 1957 (Wakankar 1975). In the following years he continued to explore the region and located a total of 754 rock shelters out of which over 500 contain paintings. Between 1972 and 1977 excavations were conducted in more than a dozen of these shelters by V.S. Wakankar (Vikram University, Ujjain), V.N. Misra (Poona University, Pune) and Susanne Haas (Museum fuir Voikcrkunde, Basle). One of these shelters III F-23 which was excavated by Misra produced a continuous cultural succession from the Lower Palaeolithic to the Mesolithic in a stratified and primary context. The maximum thickness of the habitation deposit encountered was 3.80 m, but this occurred only in trenches E and F out of the total of 8 trenches excavated in the shelter. Altogether eight layers were recognized. Layers 1, 2 and 3 represent the Mesolithic period, layer 4 the Upper Palaeolithic, layer 5 the Middle Palaeolithic and layers 6, 7 and 8 the Lower Palaeolithic. From this excavation more than 1,00,000 stone artefacts from four cultural periods were recovered. From the Palaeolithic layers a total of 29,748 artefacts were found. Of these 18,721 (62.93%) belong to the Lower Palaeolithic (fig. 2), 8,505 (28.59%) to the Middle Palaeolithic (fig. 3) and 2,522 (8.48%) to the Upper Palaeolithic (fig. 4). Misra classified the Palaeolithic artefacts using the typological scheme of Francois Bordes elaborated in his *Typologie du Paieotiihique Ancien el Moyen* (Bordes 1961).



Fig. 2: Lower Palaeolithic Artifacts

Methodology

This study is based on a collection of 11,536 artefacts recovered from trenches E and F. These trenches were selected because they produced the thickest cultural deposit and provided a complete cultural sequence. The study follows the classification of the artefacts already made by Misra (1985).

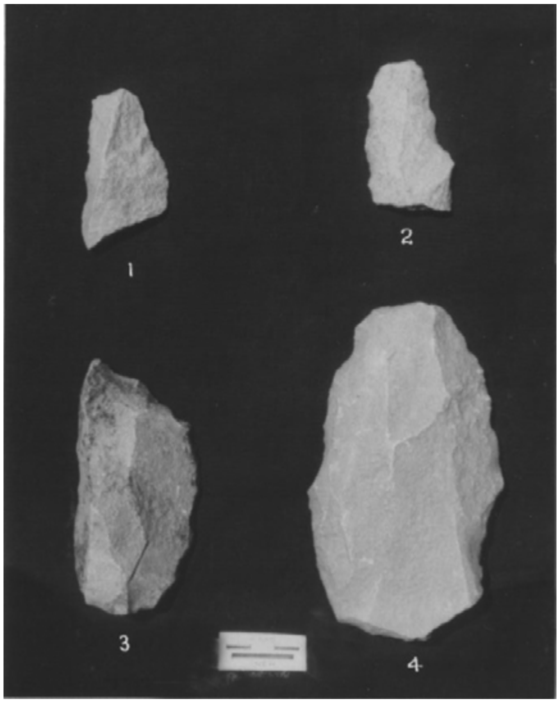


Fig. 3: Middle Palaeolithic Artifacts

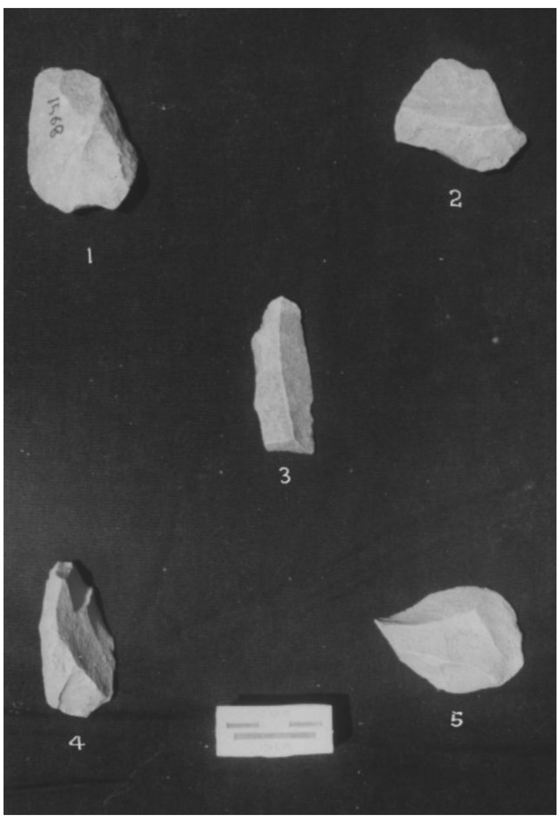


Fig. 4: Upper Palaeolithic Artifacts

The research has been carried out in three stages: (a) defining the attributes and variables for measurements and taking actual measurements of the artefacts, (b) designing a data base structure for feeding morphometric data to be able to use computer softwares and (c) the employment of several statistical techniques for the analysis of these data.

Since the thrust of the dissertation concerns the variability in the Palaeolithic assemblages in terms of morphological attributes and metrical variables, detailed morphological and metrical data of the artefacts are generated. The methodology for this study has been developed on the basis of available literature on this subject. The schemes proposed by D.A. Roe (1964, 1968, 1973), and G.R. Sharma and J.D. Clark (1983) have been modified to suit the assemblages considered for the study. Terminology, definitions and procedure followed in this study are derived mainly from Bordes (1961), Roe (1964, 1968, 1973), Clark and Kleindienst (1974). Other works which have been consulted include Kleindienst (1962), Mason (1967), Movius (1968), Crabtree (1972), Tringhum *et al.* (1974), Kamminga (1978), Keeley (1980), Dibble and Bernard (1980) and Salim (1986). As there are differences in the definitions of the attributes and variables and procedures suggested by different workers, I describe below the terminology, definitions and procedure as adapted from above mentioned studies for applying them to the data from Bhimbetka.

For the purpose of this study the artefacts have been grouped into two broad categories:
(i) Shaped tools and (ii) Simple artefacts. Shaped tools are those artefacts which show deliberate human workmanship including secondary retouch or edge trimming which may or may not alter the primary form of the artefact. Simple artefacts are those pieces which are by-products or remnants of intentional flaking which may or may not show evidence of utilization and/or minor modification and these do not fit in any tool class. Though Levalloisian flake is classified as a tool in Bordes scheme but in this study it has been included in the category of flakes. The tool types alternate thick abrupt retouch and alternate thin abrupt retouch and debit age have not been considered for the study.

Morphological Attributes

Following attributes have been considered though all of them are not necessarily applicable to every artefact type.

Raw Material: The raw material used for fabricating artefacts has been classified into sandstone/ortho-quartzite, quartz, chert, agate and chalcedony.

Physical Condition: By physical condition is meant the overall state of preservation of the objects. In addition to surface modification of the specimen, the edges are of particular interest in defining the physical condition. On the basis of degree of weathering on the artefacts they have been classified as fresh, slightly weathered, moderately weathered, and heavily weathered in the increasing order. For example Tresh refers to those artefacts which are not weathered at all.

Completeness: Completeness of an artefact has been adjudged either (i) complete or (ii) broken. This distinction has been made on the basis of breakage on any side or end of the artefact either due to manufacture or use or depositional or post-depositional processes.

Plan Form: Plan form is the shape of the artefact when seen in plan view, i.e. when the artefact is oriented in the horizontal plane (Clark and Kleindienst 1974). In the case of handaxes it has been categorized into lanceolate, sub-triangular, amygdaloid, elongated cordiform, sub-eordiform, oval and limande. For cleavers it has been grouped into rounded butt transverse edge, rounded butt oblique edge, rounded butt-convex edge, pointed long butt oblique edge, pointed long butt convex edge, pointed short butt transverse edge, pointed short butt oblique edge, truncated convergent butt transverse edge, truncated convergent butt oblique edge, truncated convergent butt-convex edge. In ease of non-biface tools, flakes and blades it has been categorized into short quadrilateral, long quadrilateral, short triangular, long triangular, short irregular, long irregular and elliptical

Primary Form: It is the form of the blank/rock piece on which the artefact was fashioned. It has been categorized into side struck flake, end struck flake, indeterminate flake, proximal end of flake, distal end of flake, midsection of flake and chunk/natural rock piece.

Though Bordes (1961) has defined *dejete* side scraper as convergent *racloir* (side scraper) of which the axis of the tool is clearly inclined on the axis of the flake, artefacts of Bhimbetka assemblages which are classified as dejete side scrapers are not necessarily made on flakes but on natural rock pieces. However, they bear other typological characteristics of dejete scrapers and hence have been grouped in that category.

Retouch: Broadly, retouch along the margins can be defined as intentional modification of an edge through flaking for the purpose of either rejuvenating, blunting or shaping the margin of a stone artefact (Kamminga 1978). Tools from Bhimbetka are found to be retouched to varying degrees and since Bordes' typological scheme is based on different characteristic traits of retouch, it has been given due importance in morphological as well as metrical analysis.

Character of Retouch: It has been recorded on the basis of continuity of retouch along the working edge(s) of the tool and has been grouped into (i) continuous and (ii) discontinuous. In some cases it is indeterminate owing to weathering or abrasion.

Retouch Nature: *Most* of the artefacts from Bhimbetka show a distinct type of retouch scar pattern which does not fit in any of the scar patterns designated by Bordes, Clark and Kleindienst (1974), Sharma and Clark (1983) and others like Movius (1968), Tringhum *et al.* (1974), Kamminga (1978) and Salim (1986). To some extent it resembles the scalar retouch pattern of Bordes but the scales do not overlap with one another. I have described this variety of retouch as 'scalar in one row only'. The other scar patterns resulting from retouch have been classified as parallel, sub-parallel, step, arid scaled and they have been recorded edgewise. The distinctive features of these scar patterns are as follows:

i. Parallel: Retouching is narrow, shallow, elongated and parallel.
ii. Sub-parallel: It is less regular than parallel retouch.
iii. Step: Retouch is like the steps of a staircase.
iv. Scaled: Broad and short, wider at the distal end than at the base, it resembles the scales of a fish (see Bordes 1961: 8-9).
v. Scalar in one row only: Same as scaled but in-one row only.

Retouch Class: It has been categorized in the following way based on Bordes (1961):

i. Unifacial Normal: Retouching is done from the ventral on to the dorsal face of the
ii. Unifacial Inverse: Retouching is made from the dorsal face on to the ventral face.

iii. Bifacial: Retouch is done both dorsally and ventrally on the same edge of the tool.
iv. Alternate - Normal and Inverse: Retouch is done partly from the ventral and partly from the dorsal face on the Scattered and/or different edge(s).

Location of Retouch: To determine the location of retouch, artefacts which preserve the striking platforms have been oriented by placing them proximally. Where evidence of striking platform is not preserved or the artefacts are made on rock piece/chunk, the specimens have been oriented by placing their broader ends proximally. Then location of retouch has been determined as on left or right lateral sides or proximal or distal ends. Where more than one edge is retouched (e.g., in case of end and side scraper) its location is recorded in a combined form e.g., one side edge and one end edge (see Appendix B).

Retouch/Utilization Edge Form (Plan View): This is the form of the edge of artefact after modification by retouch or utilization when seen in the plan view (Clark and Kleindienst 1974). Edge forms have been classified as straight, convex, concave, notched, denticulate and their various combinations (see Appendix B). Artefacts whose one edge is modified by retouching or utilization, their edge forms have been recorded simply either straight, convex or concave or whatever is the form of that edge. But where two or more edges are modified, the form of each retouched edge has been judged separately and recorded in their combined forms. For instance, a dejete side scraper which has three retouched/utilized edges of straight, convex and concave form respectively, the edge form of this tool has been recorded as straight-convex-concave.

In practice the edge form, in most cases, is not uniformly straight, convex or concave; rather it is wavy. In these cases in order to reduce the number of sub-categories Bordes (1961) 'principle of dominance of trait' has been applied. For example, a single side scraper has a wavy edge whose more than 50% is convex and less than 50% is straight, the edge form of this artefact has been considered to be convex.

Instead of distinguishing many categories as in the case of double side scraper, Bordes has made only three homogeneous types of convergent side scrapers: straight, concave and convex. Here he has applied another rule of simple dominance based on "rarity"/ infrequency: the concave trait is more dominant than the straight, which is more dominant than convex. For instance, a convergent side scraper with one straight edge and one convex edge has been classified as straight convergent side scraper according to true rule of dominance. But its edge form has been recorded as the edges are i.e. straight-convex.

Cross Section: It is the section across the short axis of the artefact midway down and at right angles to the long axis (Clark and Kleindienst 1974). It has been classified as biconvex; lenticular, circular, plano-convex high-back, plano-convex low-back, triangular, sub-triangular, trapezoid, rhomboid, parallelogram, irregular quadrilateral, polygon, concavo-convex and irregular.

Presence of Cortex/Old Weathered Surface: The reduction of cortical area or old weathered surface of the artefact has been expressed in terms of percentage such as 100% cortex/ old weathered surface meaning no flake scar, 50% meaning the removal of 50% cortex and so on. This does not necessarily imply a direct relationship between the number of flake scars and the cortical or old weathered area removed. However, recognizing cortical/ old weathered area on a substantial number of artefacts (which undergone weathering due to post depositional processes) has been found difficult.

Platform Type: It has been classified into two categories (i) natural and (ii) prepared. If the platform retains cortex or portion of a simple fracture it has been called natural, and if the platform is formed by flake scars which indicates the evidence of previous preparation of platform in the core it has been termed prepared. When the platform is not preserved in a broken flake it has been recorded as broken. Where only bulb or cone of percussion remains without any portion of the striking platform it has been termed pointed platform. In case of pointed platform its type has been recorded as indeterminate. The attribute and variable related to platform have been analysed in blades and all types of flakes except in indeterminate where platforms do not exist.

Scar Pattern: The pattern developed on the surface(s) of the core due to removal of flakes from various directions has been grouped into the

following categories and has been recorded on each face separately. The convex surface of the core has been considered dorsal face and the comparatively flat or concave surface a ventral face.

i. Unidirection: The flaking has been done on the core in one direction only. These are (a) irregular, (b) convergent and (c) parallel. (Where only one flake is removed from a surface it is recorded as unidirection irregular).
ii. Bidirection: The removal of flakes is from two directions. They are two types (a) irregular and (b) opposed.
iii. Multidirection: Flakes have been struck off in more than two directions. They are found in radial and irregular pattern.

Lateral Edge Form (Profile View): This is the shape of the lateral edge of the artefact when seen at right angles to the plan view (Clark and Kleindienst 1974). It has been classified into straight, sinuous regular and sinuous irregular. It has been recorded separately for left and right lateral edges. It has, been applied to handaxes and cleavers only.

Transversal Edge Form (Plan View): This is the shape of the transversal edge of the artefact when seen in plan view (Clark and Kleindienst 1974). This has been considered in case of handaxes and cleavers only. It has been categorized into straight, oblique right (north-west-south-east), oblique left (north-east-south-west), convex, concave, and pointed,

Butt Plan: This is the shape of the butt of the artefact when seen in plan view. This attribute too has been considered in case of handaxes and cleavers only. It has been categorized into rounded, pointed long, pointed short, transverse, oblique and convergent.

Metrical Variables

A number of metrical variables have been defined and studied to delineate objectively the variability in the palaeolithic assemblages. This quantitative assessment has enabled comparison between the two assemblages. Various variables have been considered for this purpose. But in this case too (like morphological attributes) all of the variables are not necessarily applicable to every artefact type. The variables are as follows:

Weight: Weight of all artefacts have been measured to their nearest grams.

Linear Measurements: D.A. Roe's (1973) suggestion made for large cutting tools from Kalambo Falls has been adapted for the measurements of handaxes and cleavers. The suggestion to measure handaxe and cleaver from the actual line drawings of the artefacts has been considered herein. For non-biface tools, flakes, blades, chips and cores length, breadth and thickness have been measured using a measuring rectangle. The measurements are as follow:

1. Length: Maximum length of the artefact along its long axis.
2. Breadth: Maximum breadth measured at right angles to the long axis of the artefact.
3. Thickness: Maximum thickness when the artefact is seen sideways.
4. LI: Distance from the butt end to the position of the artefact's maximum breadth.
5. Bl: Breadth at a point of 1/5th of the artefact's length from the tip end.
6. B2: Breadth at a point of 1/5th of the artefact's length from the butt end.
7. Tl: Thickness at a point of 1/5th of the artefact's length from the tip end.
8. Cleaver Edge Length (CEL): Length of the straight line between the extremities of the cleaver edge or bit.
9. Cleaver Edge Angle (CEA): The angle between the cleaver edge (in this case the straight line between extremities of the cleaver edge) and the long axis of the artefact in plan view.

From these measurements following indices have been derived (depending upon the tool types) by combining pairs as follows:

i. Thickness upon Breadth (T/B), (for all artefacts types except cores).
ii. Tl upon Length (Tl/L), (for handaxes and cleavers only).
iii. Breadth upon Length (B/L), (for all artefact types except cores).
iv. Bl upon B2 (B1/B2), (for handaxes and cleavers).
v. LI upon L (Ll/L), (for handaxes and cleavers).
vi. Cleaver edge length upon Breadth (CEL/B), (for cleavers only).

Number of Flake Scars on Each Surface: Number of flake scars has been counted on each surface of the shaped tools and cores. But in the case of flakes, blades and chips this has been recorded on the dorsal surface only.

Number of Planes Worked: This variable has been considered only in the case of cores. If flakes have been struck off from only one surface of the core, it has been recorded as worked on one plane. If the removal is from both surfaces it has been recorded as worked on two planes.

Platform Length: It is the maximum length between the two shoulders of the striking platform (Clark and Kleindienst 1974). It has been measured to the nearest millimeter. Variables relating to platform like length, breadth, angle have been analysed for flakes (excluding indeterminate flake) blades and microblades.

Platform Breadth: It is the maximum measurement across the platform length at its right angle (Clark and Kleindienst 1974).

Platform Angle: It is the angle formed by the intersection of the surface of the platform and the proximal end of the ventral surface of the flake (Clark and Kleindienst 1974). It has been measured using goniometer.

Number of Retouch Scars on Either Face: It has been recorded face-wise and edge-wise. For instance, in the case of a side scraper with alternate retouch where retouching has been done on both faces and both edges, retouch scars on dorsal and ventral face as well as on left and right sides have been recorded separately. Then the total number of retouch scars has been counted.

Retouch Length: The length of retouch has been measured with the help of a synthetic string placed against the retouched edge(s) of the tool Then the length of the String has been measured in millimeters. The measurement has been taken separately according to the position(s) of the retouched edge(s) of the tool i.e. left or right side or proximal or distal end. Then all the measurements have been added together. So finally analysis has been made on the total retouched length of a tool. Similarly, other variables relating to retouch like retouch angle and invasiveness of retouch have also been recorded edge-wise and analysis has been carried out on the basis of their average.

In a small number of tools, portion(s) of retouched edges are so badly damaged that characteristics of retouch could not be detected. So these have been recorded from the detectable portions only.

Retouch Angle: It is the angle formed at the edge of a tool between the dorsal and ventral faces where one or both faces of the tool is retouched (Clark and Kleindienst 1974). When an edge is retouched the angle is called simply 'edge angle' by Tringhum *et al*. (1974), and 'specific edge angle' by Kamminga (1978). Also this angle is known as 'included angle' (CLUW. 1971) and 'damage angle' (Knudson 1979). I have applied the term used by Clark and Kleindienst for this purpose.

Several methods are used by researchers to take retouch/edge angle measurements. These are: carpenter's template method (Crosby 1967), polar coordinate graph method (Movius *et al.* 1968; Wilmsen 1970; Dibble and Bernard 1980), clay method (Burgess and Kvamme 1978 ; Dibble and Bernard 1980), poster putty method (Fergussion 1980), caliper method (Dibble and Bernard 1980) and goniometer method (Clark and Kleindienst 1974; Kamminga 1978; Keeley 1980). Here I have used the goniometer method. Since retouch angle very often considerably varies along the edge of the tool, minimum 3 to 5 measurements, depending on the edge length, have been taken and their average has been calculated. Following the general agreement of the First CLUW of 1977 (Hayden 1979: 7) the measurement has been taken 1 mm back from the juncture of the dorsal and ventral faces.

Invasiveness of Retouch: Clark and Kleindienst (1974), and Sharma and Clark (1983) have classified the invasiveness of retouch into three categories: Marginal, semi-invasive and invasive. As per their definition all the artefacts from Bhimbetka are found to be in the first category. But this invasiveness varies from 1 mm to 20 mm depending on the size and type of the tool. Therefore instead of describing it subjectively I have taken the actual measurements of the extent of retouch scars on the surface of the tool from the edge. An average of 3-5 readings has been recorded since retouch scars do not uniformly extend along the edge of the tool.

Length and Breadth of Biggest Scar: It has been considered for cores only. The length of the biggest flake scar on the core has been measured by taking the maximum length of that scar following an imaginary line which divides equally the point of impact i.e. negative bulb of percussion. The breadth is the maximum measurement between two ridges at right angles to that line. They have been

measured separately for dorsal and ventral face of the core.

Chord Length: This variable has been considered for notch and notch end. It is the length of the straight line between the extremities of the notched edge. It has been measured using millimeter graph paper.

Depth of Notch*:* It is the distance from the straight line, between the extremities of the notched edge, to the maximum point of concavity of the notched edge. This too has been measured with the help of millimeter graph paper.

Statistical Analyses

The huge body of data thus generated have been computerised using dBase III+, Basic, 'Minitab' 'Statgraphics' and 'Harvard Graphics' softwares in order to carry out the quantitative analysis on morphological attributes and metrical variables. The statistical techniques that have been employed for this purpose are Distribution of Frequency and Percentage, Mean, Standard Deviation, Coefficient of Variation, Mann Whitney U Test, t Test, Chi-Square Test, and Cluster Analysis according to their suitability for specific situations.

For morphological attributes whole assemblages have been considered and distributions of frequency and percentage have been computed. These have been done cultural period-wise as well as depth-wise to assess the variability between and within the cultural periods. They have been worked out artefact type-wise to see the variability between and within the artefact types. The results have also been expressed through histograms and frequency curves of some of the important features.

RESULTS

The analyses show differences, either significant or insignificant, within and between the cultural periods. The differences are significant in the case of quantitative composition of the assemblages of three periods, namely Lower, Middle and Upper Palaeolithic[*].

The total number of artefacts from trenches E and F was 11,536. A detailed quantitative analysis of the assemblages has been carried out. The artefacts have been grouped into two broad categories: (1) shaped tools and (2) simple artefacts. Frequencies and percentages of the analysed artefacts from the two trenches are shown in table 1.

The quantitative analysis of the artefacts shows that there are variations in the artefact types among the three cultural periods. This variation is less between the Lower Palaeolithic and the Middle Palaeolithic than between the Middle Palaeolithic period and the Upper Palaeolithic period. In all there are 63 artefact types in the three periods. Of these 22 types are common in all the three periods, 22 occur only in the Lower Palaeolithic, 17 occur in the Lower Palaeolithic and the Middle Palaeolithic, 1 occurs in the Lower Palaeolithic and the Upper Palaeolithic, and 1 occurs only in the Upper Palaeolithic.

Variation is also seen in terms of frequency and percentage of artefact types. In the Lower Palaeolithic 28.97% artefacts are shaped tools and 71.03% are simple artefacts i.e. the proportion of shaped tools to simple artefacts is 1:2.47. Among shaped tools bifaces constitute only 1.76% and the proportion of cleavers to handaxes is 1.75:1. Among handaxes the oval shaped handaxe is the most common type (31.25%). Other types are limande (18.75%), lanceolate (12.50%), sub-triangular (12.50%), sub-cordiform (12.50%), amygdaloid (6.25%), and elongated cordiform (6.25%). Among cleavers the rounded butt with convex edge and the truncated convergent butt with oblique edge (each 21.42%) are the commonest types. Truncated convergent butt with convex edge, pointed short butt with oblique edge and rounded butt with oblique edge, each constitutes 10.71%. The rounded butt transverse edge and the pointed long butt oblique edge each constitutes 7.14%. Of the other three types - pointed long butt convex edge, pointed short butt transverse edge and truncated convergent butt transverse oblique edge-constitute 3.57%.

[*] The statistical analyses of quantitative composition of the assemblages have produced 4 tables. The analyses of morphological attributes of artefact types in relation to stratum (depth) and cultural period showing distribution of frequency and percentage have produced 540 tables. Out of them 270 tables have been combined into 15 tables based on cultural period only. The analyses of metrical variables of artefact classes showing distribution of frequency and percentage and descriptive statistics have produced 310 tables. Results of various significance tests (two samples analysis) have been compiled in 32 tables. Some of the frequency distributions have been presented in 40 histograms and frequency curves. Multivariate analyses have been plotted in 80 scatter diagrams. So it is not possible to present all the result in this paper. Only the salient features of the significant result and the interpretation of analysis have been presented in this paper.

Though the Levallois flake is classified as a shaped tool in Border, scheme, in this study it has been included in the category of simple artefacts.

Table 1: Distribution of Frequency and Percentage Artefacts in Trenches E and F of Rock Shelter III F-23, Bhimbetka

Artefact type	**L.P**		**M.P.**		**U.P.**		**Total**	
	#	%	#	%	#	0//0	#	%
Shaped Tools								
Handaxes								
Lanceolate	2	0.08	—	—	—	—	2	0.06
Sub-Triangular	2	0.08	—	—	—	—	2	0.06
Amygdaloid	1	0.04	—	—	—		1	0.03
Elongated Cordiform	1	0:04	—	—	—		1	0.03
Sub-Cordiform	2	0.08	—	—		—	2	0.06
Oval	5	0.20	—	—	—	—	5	0.15
Limande	3	0.12	—	—	—	—	3	0.09
Cleavers								
Rounded Butt Transverse Edge	2	0.08					2	0.06
Rounded Butt Oblique Edge	3	0.12	—	—	—	—	3	0.09
Rounded Butt Convex Edge	6	0.24					6	0.18
Pointed Long Butt								
Oblique Edge	2	0.08	—	—	—	—	2	0.06
Pointed Long Butt Convex Edge	1	0.04					1	0.03
Pointed Short Butt Transverse Edge	1	0.04					1	0.03
Pointed Short Butt Oblique Edge	3	0.12					3	0.09
Truncated Convergent Butt Transverse Edge	1	0.04					1	0.03
Truncated Convergent								
Butt Oblique Edge	6	0.24	—	—	—	—	6	0.18
Truncated Convergent Convex Edge	3	0.12					3	0.09
Non-biface tools								
Simple Straight Side Scraper	122	4.89	30	4.29			'152	4.68
Simple Convex Side Scraper	274	10.97	110	15.74	6	8.58	390	12.03
Simple Concave Side Scraper	236	9.49	72	10.30	1	2.22	309	9.53
Double Straight Side Scraper	3	0.12	2	0.29			5	0.15
Double Straight & Convex S. Scraper	12	0.48	2	0.29			14	0.43
Double Straight & Concave S. Scraper	7	0.28	3'	0.43			10	0.30
Double Biconvex Side Scraper	15	0.60	3	0.43			18	0.55
Double Biconcave Side Scraper	16	0.64	3	0.43			19	0.58
Double Concave & Convex S. Scraper	33	1.32	2	0.29	1	2.22	36	1.10
Convergent Straight Side Scraper	13	0.52	3	0.43			16	0.49
Convergent Convex Side Scraper	23	0.92	3	0.43			26	0.80
Convergent Concave Side Scraper	16	0.64	1	0.14			17	0,52
Dejete Side Scraper	79	3.16	30	4.29	—	—	109	3.36
S. Trans. S. Scraper	26	1.04	4	0.57	—	—	30	0.92
Conv. Trans. S. Scr.	60	2.40	11	1.57	1	2.22	72	2.22

Cone. Trans. S. Scr.	24	0.96	3	0.43	—	—	27	0.83
Side Scraper with Ventral Retouch	171	6.85	27	3.86	2	4.44	200	6.17
Side Scraper with Steep Retouch	170	6.84	32	4.57	2	4.44	204	6.29
Side Scraper with Alternate Retouch	55	2.11	22	3.14			77	2.37
End Scraper	242	9.68	78	11.16	4	8.88	324	9.99
End& Side Scraper	40	1.60	23	3.29	-		63	1.94
Borer (Typ. & Atyp.)	35	1.40	8	1.14	2	4.44	45	1.38
Backed Knife (T & At)	18	0.72	3	0.43	1	2.22	22	0.68
Knife with Natural Back	14	0.56	10	1.40	3	6.66	27	0.83
Truncated Flake	261	10.44	50	7.15	6	13.32	317	9.78
Denticulate	156	6.24	66	9.44	4	8.88	226	6.97
Alternate Burinate Beak	3	0.12	—	—	—	—	3	0.09
Retouch on Ventral face	—	—	—	—	2	4.44	2	0.06
Bifacial Retouch	2	0.08	—	—	—	—	2	0.06
Notch	250	10.00	74	10.58	9	20.00	333	10.27
Notch on End	78	3.12	24	3.43	1	2.22	103	3.18
Total	2498		699		45		3242	
%	77.05		21.65		1.30		100.00	
Simple Artefacts								
Lev. Flake (Typ.)	4	0.06	3	0.17	—		7	0.08
Lev. Flake (Atyp.)	8	0.13	6	0.34	3	0.60	17	0.20
Side Flake	723	11.80	129	7.71	21	4.23	873	10,52
End Flake	1155	18.85	238	14.23	67	13.51	1460	17.60
Indeterminate Flake	117.1	19.12	374	22.37	15	3.02	1560	18.80
Blade	91	1.48	36	2.15	24	4.84	151	1.82
Microblade	6	0.09	4	0.24	7	1.41	17	0.20
Point	3	0.05	—	—	—	—	3	0.03
Chip	2649	43.24	797	47.66	354	71.37	3800	45.81
Lev. Flake Core	2	0.03	—	—	—	—	2	0.02
Discoid al Core	6	0.09	5	0.30	—	—	11	0.13
Globular Core	1	0.01	1	0.06	—	—	2	0.02
Prismatic Core	1	0.01	—	—	1	0.20	2	0.02
Pyramidal Core	3	0.05	—	—	—	—	3	0.03
Shapeless Core	303	4.99	79	4.72	4	0.80	386	4.65
Total	6126		1672		496		8294	
%	73.86		20.16		05.98		100.00	
Grand Total	8624		2371		541		11536	
%	74.76		20.55		04.69		100.00	

Unfortunately differences in terms of morphological attributes could not be tested in respect of their significance. However, from the distribution of frequency and percentages it appears that except in respect of physical condition, completeness and primary form, all other attributes, i.e. cross section, plan form and cortex may not have any significant difference within and between the cultural periods and depths.

Of the total assemblage 50.28% artefacts are fresh, 40.30% slightly weathered, 8.18% moderately weathered and 1.24% heavily weathered. The highest percentage (54.21) of weathered artefacts is found in the Lower Palaeolithic assemblage followed by the Middle Palaeolithic (37.44) and the Upper Palaeolithic (32.10). The degree of weathering also decreases from the Lower Palaeolithic to the Upper Palaeolithic. For example, the percentage of heavily weathered artefact in the Lower Palaeolithic is 1.6, in the Middle Palaeolithic 0.17 and none in the Upper

Palaeolithic. Reverse is the situation in the case of freshness of the artefacts. This pattern, fresh artefacts more at the top and weathered artefacts more at the bottom, also indicates the primary nature of the site.

It seems that the weathering of the artefact has occurred partly due to water logging in the shelter (Misra, V.N. 1985) and partly to other factors. If only water logging were responsible for weathering then all the artefacts of same raw material in any level would have been weathered. On the contrary, the same level shows fresh as well as weathered artefacts. Other factors responsible for this variation may be micro environment of soil. For instance, artefacts buried in fine textured clay soil where moisture was more might have been weathered in a greater proportion and degree. On the other hand, artefacts buried in coarse-grained sandy soil where percentage of moisture was less might have been weathered to a less proportion and degree (S.N. Rajaguru, personal communication). A micro level study of sediments, of the shelter may throw some light to determine the causes for weathering.

A substantial portion of artefacts were broken in various assemblages. Breakage in the artefact may be caused (1) during manufacture, (2) during use and (3) by natural processes i.e. depositional and/or post depositional factors (trampling, rock fall and over burden) (Petraglia 1987). The percentages of broken artefacts are more in the Upper Palaeolithic period (43.73) followed, by the Middle Palaeolithic period (29.43) and the Lower Palaeolithic period (28.93). It indicates that the small, thin and delicate objects of the Upper Palaeolithic period were broken with higher frequency than large and thick artefacts of the Lower Palaeolithic period and the Middle Palaeolithic period. Within the cultural periods no definite and regular pattern is observed.

The plan form or shape of the tool is predetermined by the tool-maker before initial fracture of the raw material (Crabtree 1972). A clear preference was made by the stone age craftsmen of Bhimbetka in manufacturing the tools. Short irregular form (37.28% in the Lower Palaeolithic period, 33.62% in the Middle Palaeolithic period and 44.18% in the Upper Palaeolithic period) is the dominant in all the periods followed by long irregular (23.11% in the Lower Palaeolithic period, 25.45% in the Middle Palaeolithic period and 32.55% in the Upper Palaeolithic period), short quadrilateral (20.98% in the Lower Palaeolithic period, 18.45% in the Middle Palaeolithic period and 13.95% in the Upper Palaeolithic period) and short triangular (7.79% in the Lower Palaeolithic period, 9.30% in the Middle Palaeolithic period and 4.65% in the Upper Palaeolithic period).

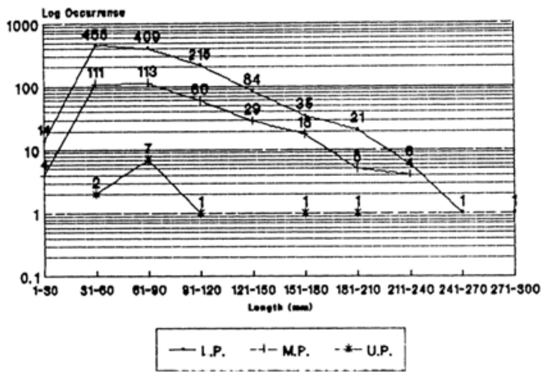


Fig. 6: Distribution of Frequency of Length of Side Scrapers (Period-Wise)

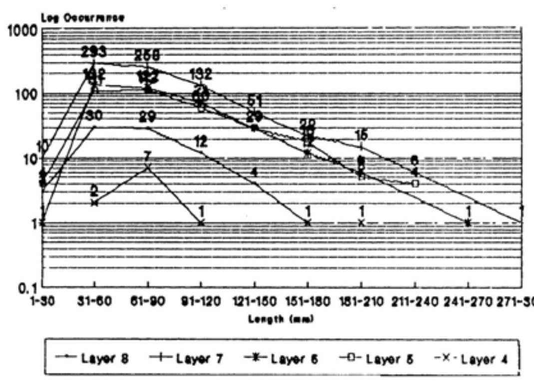


Fig. 7: Distribution of Frequency of Length of Side Scrapers (Layer-Wise)

Frequency distribution of metrical variables shows that largely the assemblage within the cultural period is heterogeneous (Figs. 6 and 7). In other words the assemblage in each period consists of both smaller and larger, broader and narrower, thicker and thinner varieties of artefacts. In comparison to each cultural period, the heterogeneity in assemblage prevails, resulting into homogeneity throughout the cultural sequence from Lower to Upper Palaeolithic. However, two samples analyses (Mann Whitney U test and t test) reveal that in spite of homogeneity, in general, between two contiguous periods there are differences, significant or insignificant, in terms of individual variables of artefact classes (for instance, see Tables 4.333 and 4.364 Alam 2001). Similarly, differences also prevail within the Lower

Palaeolithic period, i.e. between layers 8, 7 and 6. Cluster analysis indicates regular significant difference between the three cultural periods in respect of 7 artefact types (see Alam 2001). There are significant differences in other artefact types too but not regular as per cultural period and layer.

What are the factors that produce these differences or variations in artefacts and what is the significance of these variations? Here it is worth mentioning that morphometric analysis are concerned primarily with the quantification of variation and only the indirect explanation of these variations (Roe 1973). Hence it is quite difficult to present any uncontroversial explanation for the variation among artefacts. Rather there has been considerable controversy regarding the explanation of variability in lithic assemblage over the last four decades. The most important controversy arose from the interpretations offered for observed variations in the Mousterian of southwest France over functional variabilities and cultural traditions (for details see Bordes 1961; Bordes and Sonneville Bordes 1970; Collins 1969, 1970; Mellars 1970; Binford and Binford 1966; and Binford 1969, 1972, 1975, 1977, 1978, 1982).

The variability revealed in rock shelter III F-23 is probably due to following factors:
(1) Personality of i.e. motor habits of individual artificers (2) Medium i.e. (a) raw material used and (b) technology employed for manufacturing tools (3) Function and (4) culture. This variability can be explained in the following ways.

(1) **Motor Habits of Individual:** An enormous number of artefacts were produced in the shelter through the Palaeolithic period by groups of individuals. Individuals are always somewhat different from one another in their motor habits or motor performances. The artefacts they make or use exhibit slight differences in execution or use wear. Even individuals of the same culture if they are given same task under similar physical condition and using similar materials and techniques will produce slightly different results (Clegg 1977). This difference is defined as stylistic variation (Hill and Gunn 1977). At Bhimbetka the insignificant variations observed at various levels i.e. intra and inter layer and period may be related in some measure to the activities of different individuals i.e. stylistic variation.

(2) **Medium:** (a) **Raw Material:** At Bhimbetka only quartzite was used as raw material throughout the Palaeolithic period. The negligible percentage (0.032) of non-quartzite material has probably been intruded from the uppermost level. The only little variation is in the quality of quartzite used for biface and non-biface tools. But the biface sample is too small to influence the significant variation in such a huge assemblage.

(b) **Technology:** In the same culture when same raw material is used, the factors influencing the artefact variation may be technology and/or function. Between the two cultural periods the factors may be technology, function and culture tradition.

The variables of thickness, T/B, number of flake scars, and retouch length have been considered as technological indices. All non-biface tool classes (except borers and notches) as well as flakes and chips show significant difference between layers 8, 7 and 6 in respect of 1 to 3 of these variables (depending on artefact class) (see Tables 4.332-4.359 in Alam 2001). But these differences are not regular in all the layers and in all artefact classes. In respect of cultural period too the result is more or less similar. Thickness, T/B and number of flake scars significantly decrease from the Lower Palaeolithic to the Middle Palaeolithic in all non-biface tools except for knives. In case of flakes and chips thickness and T/B significantly decrease and number of flake scars increases. On the other hand, retouch length significantly increases from the Lower Palaeolithic to the Middle Palaeolithic in end scrapers, borers, truncated flakes and notches. Artefacts become significantly thinner in the Upper Palaeolithic in knives, truncated flakes, flakes and chips. Number of flake scars significantly increases in flakes and chips in the Upper Palaeolithic. In other artefact classes the value either increases or decreases insignificantly.

The most important feature, however, is that variables like thickness, T/B and number of flake scars are controlled by the primary form of tool (Alam and Misra n.d. 1992). The analysis reveals that a higher percentage of tools were made on natural rock pieces (without flaking) in the Middle Palaeolithic compared to the Lower Palaeolithic. So the artefacts show significantly less number of flake scars in the Middle Palaeolithic Thinner tools with more flake scars are considered as indicators of refinement; hence development in tool

technology. Though thickness and T/B values reasonably decrease from the Lower Palaeolithic to the Middle Palaeolithic due to presence of higher percentage of artefacts made on thin natural rock pieces but due to the same reason the number of flake scars too decreases. Since the rock pieces were naturally thin the artificers did not need to remove flakes from them to make them thin and thus they were able to make tools with minimum investment of energy and time (Alam and Misra n.d., 1992). This practice was common in all the periods but it was more pronounced in the Middle Palaeolithic. That is why in this period though thickness of artefacts reduces significantly, the number of flake scars too reduces instead of increasing.

Multivariate analyses carried out by combining these 3 to 4 technological variables suggest that there was a regular and significant difference between the layers and the cultural periods. This may be explained by the fact that the variables exercised less influence individually than collectively on artefact variation. Besides, analyses have been carried out on the basis of artefact types. In these analyses the difference is regular and distinct at least in seven artefact types. These artefact types are: (1) simple convex side scraper, (2) side scraper with ventral retouch, (3) side scraper with steep retouch, (4) end scraper, (5) truncated flake, (6) notch and (7) side flake. Out of that former six types constitute 54.53% of shaped tool category and the last one constitutes 10.52% of simple artefact category.

The Levallois index gradually increases from the Lower Palaeolithic (0.19) through the Middle Palaeolithic (0.51) to the Upper Palaeolithic (0.60). Percentage of discoid core increases from the Lower Palaeolithic (0.09) to the Middle Palaeolithic (0.30). This also indicates a development in technology through time.

Considering all these features it can be stated that in general there was a trend towards technological development from the Lower Palaeolithic to the Upper Palaeolithic. This trend was more pronounced in the Middle Palaeolithic, specially in respect of the acquisition of suitable rock pieces for tool making.

However, this trend does not necessarily imply a change in techniques of tool making. Rather it seems that in all the Palaeolithic periods same techniques were applied for specific tool types. They are block-on-block technique and hard hammer technique for removing flakes from cores and soft hammer technique was used for secondary trimming or retouching the edges of tools. For instance, no change is observed in manufacturing technique of blades in the three periods. In all the periods blades seem to have been prepared by hitting the platform on the corner of core and an elongated flake came off following the edge or ridge of the core/rock (Jian Leng, personal communication). In the analysis of blades and microblades from the entire excavated area of the rock shelter V.N. Misra (1982) observed that the blades were not prepared from specialised blade cores.

3. Function: For understanding functional variability two aspects of assemblages have been considered. They are: (1) variability in the quantitative composition of the assemblages, and (2) variation in certain variables which are assumed to effect the function of the artefacts.

(1) **Variability in the Quantitative Composition of the Assemblage:** The large variety of artefact types in each period indicates that though they were used for different suits of activities at the site, it is difficult to assign positive functions to artefacts. Most likely one type was not used for one purpose. Rather a great deal of overlapping between the functions of artefact types might have taken place (Bordes and Bordes 1970; Paddayya 1982).

However, on the basis of experimental work (Semenov 1964; Keeley 1976, 1977, 1980); use wear analysis (Keeley 1976, 1977, 1980); edge angle analysis (Kamminga 1978; Fergussion 1980); ethnographic parallels (Gould 1968, 1971; Camerio 1979) and considering the environment of the site it can be tentatively said that butchering, meat cutting, wood cutting, wood whittling, wood planning, wood shaping, wood wedging, hide scraping, skin cleaning, slicing, boring and throwing (missile) might have been the principal activities performed by these tools.

It is more difficult to attribute functional variations between two periods, because the appearance of new artefact types or disappearance of old ones may not necessarily imply a change in activities. Rather, the same activity might have been performed by clearly different tool types (Mellars

1970). Thus the typological variability observed between the cultural periods may be explained in two ways. Either it is due to the influence of two different cultural traditions or it may be due to changes in activities. For instance, disappearance of handaxes and cleavers in the Middle Palaeolithic may be due to the influence of two completely different cultures. If this assumption is valid then one has to accept that the tasks which were being performed by handaxes and cleavers in the Lower Palaeolithic were performed by other tool types such as large and heavy scrapers in the Middle Palaeolithic. In this context it is particularly relevant to recall Gould's (1968: 47) observation that the Western Australian aborigines effectively butchered large animals (kangaroos, euros, emus) by simple wooden wedges and stone flakes. In another observation on the Australian Aborigines he notes that "the large wood working scrapers are handled and are used as handaxes or scraper planes" (Gould 1971: 160-161). If this assumption is not valid then alternative assumption, i.e. a change in activity, could be considered, though this seems rather weak.

As there is no indication of drastic change in climate during the Pleistocene in peninsular India (S.N. Rajaguru, personal communication) it is assumed that flora and fauna similar to that of today existed in the Bhimbetka region throughout the Palaeolithic period. So Palaeolithic people probably exploited similar plant and animal foods. Besides handaxes and cleavers, six other types (alternate burinate beak, bifacial retouch, point, Levallois flake core, prismatic core and pyramidal core) are absent in the Middle Palaeolithic. But even in the Lower Palaeolithic these six types occur in a negligible proportion (Table 1). Besides, out of these six, four types are core which are not important types from the functional point of view. The other variation between these two periods is in terms of frequency and percentage only. In the Upper Palaeolithic 21 types (besides handaxes and cleavers) are absent. But the, artefact classes like side scrapers, end scrapers, borers, knives, denticulates and notches continue in this period. The major differences between this period and the preceding one is in the absence of 13 types of side scrapers and in the proportion of other artefact types (Table 1). This variation may be related to cultural influences. So it can be inferred that the presence of different artefact types in a period may be related to different suits of activities and variation between two periods may be due to the influence of different cultures.

(2) Variation in Terms of Metrical Variables of Artefacts: Dimension i.e. weight, length and breadth; and retouch angle are assumed to be influencing the functional variation in 50 artefacts, (though thickness is one of the components of dimension, it has been treated as an indicator of refinement, i.e. technology).

The frequency distribution of artefacts according to weight, length and breadth shows that the assemblages in each period are dominated by lighter, smaller and narrower tools in terms of each artefact class except for handaxes and cleavers. Handaxes and cleavers are dominated by medium-sized tools. In other tool classes medium-sized tools fall into the second category. Heavier, larger and broader tools are less in all the periods, particularly in the Upper Palaeolithic. This variation within the periods, particularly in the Upper Palaeolithic. This variation within cultural period may be explained as being due to functional influence.

The analyses of two samples reveal significant differences between layers 8, 7 and 6 in side scrapers, notches, flakes and chips in terms of one to three variables of dimension (Tables 2 and 3). This variation within the Lower Palaeolithic may be related to function.

Between two consecutive periods (Lower and Middle Palaeolithic, and Middle and Upper Palaeolithic) size varies significantly in side scrapers, knives and truncated flakes in respect of a number of variables (Tables 4 and 5). In the case of side scrapers and truncated flakes this variation seems to be due to morphological attribute (primary form) of the tool. For instance, truncated flakes which show significant difference with respect to all the three variables of size between all the periods are made on 20.00% of rock pieces in the Middle Palaeolithic On the other hand in the Lower Palaeolithic and the Upper Palaeolithic not a single piece of this type is made on rock piece. Knives show significant difference between the Middle Palaeolithic and the Upper Palaeolithic. In the Upper Palaeolithic sample size in this classes is too small (only 3) to draw any statistical inference.

Variation is seen in the case of retouch angle too where it varies from 40° to >100° in different tool classes in different periods. The lowest retouch

angle (40°-45°) is seen in cleavers and the highest (>100°) in side scrapers and end scrapers. Based on experimental work and on ethnographic analogy, Fergussion (1980: 66-68) states "Each scraping implement will have an edge angle of over 55° and each cutting edge will have an edge angle below 60°". Though t tests show significant difference in retouch angle between some layers and periods in side scrapers, end scrapers, truncated flakes, denticulates and notches, the variation is not so extreme as to make the retouch angles of two different layers/periods fall into distinct categories i.e. >55° or <60°. For instance, in side scrapers difference is statistically significant between the Lower Palaeolithic and the Middle Palaeolithic. The median retouch angle in the Lower Palaeolithic is 79° whereas in the Middle Palaeolithic it is 82°. Similarly, in end scrapers median retouch angle is 80° in the Lower Palaeolithic and 78° in the Middle Palaeolithic. On this basis an inference can be derived that both scraping and cutting activities were carried out in all the periods and so there may not have been significant change in the activities during the three Palaeolithic periods. However, use wear analysis may throw some more light on this aspect of Palaeolithic man's behaviour.

4. Culture: The variations in artefacts between the periods may be due partly to development of technology and partly to some cultural elements. Since these periods represent three different cultures (Lower, Middle and Upper) the variations could be seen as characteristics of particular cultural periods too.

Thus from the discussion it becomes increasingly clear that no single factor is responsible for artefact variants but a combination of all four factors (see Clegg 1977).

Site Formation: Apart from the individual, technological, functional and cultural variation of the assemblages some inference can be drawn on the formation of archaeological data in the rock shelter through the analysis of some morphological attributes. These attributes are: physical condition, breakage and raw materials.

The analysis of these attributes has revealed that the site is primary in nature. But no site is in mint condition. In this rock shelter too some disturbance had been noticed. This seems to be due to (1) weathering, (2) breakage, and (3) vertical intrusion of artefacts.

(1) Weathering: Artefacts have been weathered in varying degrees in all the levels due mainly to water logging in the rock shelter. The percentage of weathered artefacts gradually increases from top to bottom. The other factors may be the type of quartzite used (Clark grey quartzite is more resistant to weathering than yellowish quartzite) and micro environment of soil (for details see Alam 2001).

(2) Breakage of Artefacts: Even though this study does not attempt to find out the cause of breakage, through observation it appears that a good proportion of artefacts are transversally broken. This may be due to trampling by the artificers and/or over burden (Schiffer 1976; Sutton 1985; Petraglia 1987). A high percentage of artefacts are longitudinally broken which may be related to manufacturing process (Sutton 1985; Petraglia 1987).

(3) Vertical Displacement of Artefacts: This is indicated by the presence of a small percentage (0.032%) of non-quartzite artefacts in the Palaeolithic levels. It is also quite possible that quartzite artefacts (particularly small ones) too were displaced both horizontally and vertically. The extent of displacement can be accounted by conjoining the artefacts. It also seems that a small quantity of artefacts might have been brought to the shelter by rain water or other natural or human agencies from the higher surface, particularly western side of the shelter. This assumption is based on the presence of very few (negligible amount) moderately abraded artefacts in the shelter.

Future Research

The study was carried out long ago and it had to be completed within a prescribed time. So all the ideas which were in mind could not be materialized due to many factors. So this research work had some drawbacks which may be summarized as follows:

1. Though the objective of the study is to find out variations in all the Palaeolithic periods for each artefact type but due to absence of certain artefact types in the Upper Palaeolithic period it could not be made for them.
2. Due to very small sample size in eighteen artefact types the interpretation made for them on the basis of distribution of frequency and

percentage is less reliable.

3. There is only one layer in each of the Middle Palaeolithic period and the Upper Palaeolithic period. So there is little scope to see the variability within these periods. Rather this scope is wider in the Lower Palaeolithic period only.
4. In the case of purposive (non-random) sample it is not generally possible to get strictly valid estimates of the sampling error or standard error (Murthy 1977; Mian and Miyan 1984; Kothari 1986). So the reliability of the tests could not be made.
5. Significance test between and within the cultural period has been made with respect to metrical variables only. Similar test (i.e. Analysis of variance, Chi-square test) for morphological attributes could not be done as because their assumptions do not fit here. For instance, in many artefact types occurrences are very few (less than 3) and in some cells of the frequency distribution table there is no observation. In the case of qualitative (morphological) data 'pooling' can not be applied.

But the author believes that there is ample scope for further research and develop the discipline. The following aspects many be considered for better understanding of the development of the Paleolithic industry of Bhimbetka in time and space:

1. The analysis of the morphological attributes and metrical variables of the tools alone is not enough to reconstruct the past cultural systems. Experimental and use wear studies of the assemblages will be helpful in reconstructing the prehistoric behavioral pattern.
2. To delineate the natural and cultural formation processes operating at the site it would be necessary to identify geological and geomorphological factors, spatial distribution of the assemblages and attempt to conjoin the stone artefacts. To know the geological or geomorphological factor certain analysis like serving may be carried out.
3. Significance tests for morphological attributes using some advanced softwares will help in assigning the intra and inter period variability in more detail.
4. Two samples analyses (Mann Whitney U test and t test) can be done on the basis of artefact types. This will be useful for comparing the results with those of multivariate analysis.
5. Cluster analysis can be carried out with the actual observations of the artefacts for the 21 artefact types which could not be done on the personal computer due to large sample size.
6. For measuring the metrical variables like retouch angle, more advanced techniques may be used in future study.
7. As it is already mentioned that certain types of Upper Paleolithic tools were absent in the trenches E & F and number of other types of tools were also very few compared to those of the Lower & Middle Paleolithic periods so the results of the comparative study was less reliable. It can be considered for carrying out further study with the Upper Paleolithic artifacts of all the trenches the rock shelter.
8. We measured only the length of working edge of the artifact. Remaining portion was left out. But to measure the working portion of the tool one can measure the unworked/ un-retouched portion also. This way our researcher can measure the proportion of exploitation of an artifact by the took makers/users.
9. To know the type technological changes of the artifacts in terms of time and space comparative analysis can be carried out with those of other similar archaeological sites in India.
10. Out of fourteen rock shelters excavated in the *area* only four have yielded the Lower Palaeolithic cultural material. In three of them there are long gaps in the cultural sequence. Deposits of the Middle Palaeolithic and the Upper Palaeolithic are missing and the Mesolithic deposits directly overlie the Lower Palaeolithic deposits in these shelters. Only in shelter III F-23 a continuous succession is seen. Why was this particular rock shelter selected for occupation all through the Palaeolithic period? This can be studied from the settlement system perspective.

Conclusion

Bhimbetka, located in the Vindhya Hills 45 km south of Bhopal, contains the maximum number of rock shelters of the area. Out of 243 shelters, 133 have paintings. Ecological setting of Bhimbetka suits the hunting gathering way of life.

The climate of Bhimbetka is tropical monsoon and the hills are covered with dense deciduous

forest and shelter much wild life. Again many trees and plants in the forest have edible flowers, fruits, seeds, roots and tubers. There are three perennial springs and several creeks in the area. Bhimbetka thus has ample provision for all the basic requirements of man — shelter, food and water. There is no evidence that the environment in the past was significantly different from what is today. Prehistoric man thus had a very suitable environment in and around Bhimbetka. It is therefore no surprise that prehistoric man took full advantage of these facilities and inhabited these shelters in large numbers over a period of more than 100,000 years.

The antiquity of man's occupation in Bhimbetka has been well attested by archaeological and historical resources. Excavations in a number of rock shelters have revealed the occupational history of man here from Late Acheulian to the beginning of historical times. Artificially made stone floors were traced in all the phases of occupation. Besides these, Acheulian people made enclosures also by arranging large boulders outside the shelter and Mesolithic people built walls of stone boulders in the cave probably for partitioning the cave into compartments. The Acheulian phase is very well defined, the best evidence of which comes from the rock shelter III F-23. Middle Palaeolithic and Upper Palaeolithic cultures are not so well represented as observed in their preceding and succeeding phases. During the Mesolithic period maximum number of rock shelters were occupied, clearly showing that there was a phenomenal increase in population probably due to increase in food resources or new innovations in technology and more efficient exploitation of food resources or both. The Mesolithic people introduced a completely new technology as well as new type of raw material i.e. cryptocrystaline silica. The technology consists essentially of microlithic tools which were made on slender microblades detached from cylindrical cores by pressure technique. The microliths were made by blunting one or more margins. The Mesolithic people buried their bodies within the rock shelters in the living areas. The Mesolithic hunter-gatherers introduced the paintings on the walls and ceilings of the rock shelters, which continued to the historic period. The paintings at Bhimbetka may be classified broadly in two groups: one depicting scenes of hunter-gatherers and the other fighters, riding on horses and elephants and using metal weapons. The first are considered prehistoric while the second are of the historic period. The Mesolithic hunter-gatherers of rock shelters came in contact with the settled agriculturists of the plains. This contact brought to an end not only the use of stone technology and the hunting-gathering way of life but also the cave dwelling among the people of Bhimbetka.

The present study confines to only Palaeolithic assemblages of rock shelter III F-23 at Bhimbetka. This is the first attempt to assess the temporal variation in Palaeolithic assemblages in a primary context in India. It has dealt with the artefactual material left by the Palaeolithic people in rock shelter III F-23 Bhimbetka. It has covered typo-technological, functional, cultural and stylistic, aspects of artefact variants. It has also treated to some extent the formation of archaeological record at the site. However, technological aspect of the lithic industries has been emphasised. The approach has been quantitative analysis of morphological attributes and metrical variables of artefacts. Simple statistics cannot analyse all the attributes and variables at a time. They give a broad view of the assemblages. Various tests reveal the degree of variation in the artefacts within (between layers) and between the cultural periods, i.e. intra and inter cultural periods. Cluster analyses focus the combined effect of all the metrical variables and a few selected variables which are assumed to be influencing the technology of the artefacts.

The inferences derived from different analyses are by no means to be treated as final conclusion but rather as interpretative suggestions. These can be summarised as follows:

1. There are variations in artefact types between three cultural periods. The variation between the Lower Palaeolithic and the Middle Palaeolithic is less and between the Middle Palaeolithic and the Upper Palaeolithic is more. Except for handaxes and cleavers and six other minor types there is consistency in artefact types between the Lower Palaeolithic and the Middle Palaeolithic. In the Upper Palaeolithic besides handaxes and cleavers, 21 other types are absent. The significant variation is seen in terms of frequency and percentage in artefact types in different

periods. But consistency is present in all three periods in terms of artefact classes except handaxes and cleavers (Table 1).

2. The assemblages are heterogeneous in all the layers and in all the periods. They are dominated by lighter, smaller, narrower and thinner artefacts in all artefact classes except handaxes and cleavers. Handaxes and cleavers are dominated by medium-sized artefacts. In general, heavier, larger, broader and thicker artefacts are more in layer 7 of the Lower Palaeolithic. Similarly, such artefacts are more in the Lower Palaeolithic and the Middle Palaeolithic than in the Upper Palaeolithic in all artefact classes except borers. Borers are heavier, larger and broader in the Upper Palaeolithic than in the preceding two periods.

3. Stylistic variation (insignificant difference) prevails in all the artefact classes within (between layers 8, 7 and 6) and between all the cultural periods.

4. There was a slight development in technology within the Lower Palaeolithic (between layers 8, 7 and 6) which has the longest duration of all the Palaeolithic periods. Significant difference in seven artefact types with respect to technological variables is suggestive of technological development in the Palaeolithic industries in time. In the Middle Palaeolithic the trend of development seems to be more concentrated towards the acquisition of suitable rock pieces which is a component of lithic technological system.

5. Different suits of activities like butchering, meat cutting, wood cutting, wood whittling, wood planning, wood shaping, wood wedging, hide scraping, skin cleaning, slicing, boring and throwing (missile) might have taken place at the site. Similar type of activities perhaps took place in all the periods. There does not appear to have been any major change in activities between the periods.

6. Though the objective of the study is to find out variations in all the Palaeolithic periods for each artefact type but due to absence of certain artefact types in the Upper Palaeolithic period it could not be made for them.

7. Due to very small sample size in eighteen (see table 4.1) artefact types the interpretation made for them on the basis of distribution of frequency and percentage is less reliable.

8. There is only one layer in each of the Middle Palaeolithic period and the Upper Palaeolithic period. So there is little scope to see the variability within these periods, Rather this scope is wider in the Lower Palaeolithic period only.

9. In the case of purposive (non-random) sample it is not generally possible to get strictly valid estimates of the sampling error or standard error (Murthy 1977; Mian and Miyan 1984; Kothari 1986). So the reliability of the tests could not be made.

10. Significance test between and within the cultural period has been made with respect to metrical variables only. Similar test (i.e. analysis of variance, Chi-square test) for morphological attributes could not be done as because their assumptions do not fit here. For instance, in many artefact types occurrences are very few (less than 3) and in some cells of the frequency distribution table there is no observation. In the case of qualitative (morphological) data 'pooling' can not be applied.

11. The site is primary in nature. Some disturbance took place by the weathering of artefacts due to water logging in the shelter and micro environment of the sediments; by breakage of artefacts due to trampling and/or over burden; by vertical and probably horizontal displacement of artefacts and perhaps by transportation of a few artefacts from the nearby higher surface.

Table 2 Maim Whitney U Test of Side Scrapers Showing Differences Between Layers.

Variables	**Layer**			
	8&7	**7&6**	**6&5**	**5&4**
Weight	....	.....	......	......
Length	....	.....	......	......
Breadth	....	.....	*	......
Thickness	*	.....	*	......
Retouch Length	....	.....	......	......
Number of Flakes Scars	....	.....	......	......
Number of Retouch Scars	....	.....	......	*

Invasiveness of Retouch	....	*	*	......
TIB	....	.....	......	......
B/L—	....	*	......	......

* denotes significant difference between two samples at 0.05 level of significance at a given degree of significance at a given degree of freedom.
.... denotes insignificant difference

Table 3. Mann Whitney U Test of Truncated Flake Showing Differences Between Layers.

Variables	**Layer**			
	8&7	**7&6**	***6&5***	**5&4**
Weight	....	....	*	*
Length	*	....	*	*
Breadth	....	....	*	*
Thickness	....	....	*	*
Retouch Length	....	....	*	*
Number of Flaks Scars	....	....	....	....
Number of Retouch Scars	------	--------	-------	*
Invasiveness of Retouch	....	....	....	....
B/L	....	....	....	....

Table 4. Mann Whitney U Test of Side Scrapers Showing Differences Between Periods

Variables	**Period**	
	L.P. & M.P.	**W.P. & H.P.**
Weight	----	-----
Length	*	-----
Breadth	*	-----
Thickness	*	-----
Retouch length	----	-----
Number of Flakes Scars	----	-----
Number of Retouch Scars	----	-----
Invasiveness of Retouch	----	-----
F/B	----	-----
VL	*	-----

Table 5 Mann Whitney U Test of Knives Showing Differences Between Periods

Variables	**Period**	
	LP. & M.P.	**M.P. *& V.P.***
Weight	----	*
Length	----	*
Breadth	----	*
Thickness	----	*
Retouch Length	----	*
Number of Flaks Scars	----	-----

Number of Retouch Scars	----	*
Invasiveness of Retouch	----	-----
B/L	----	-----

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Early Hunter-Gatherer Adaptations in the Tirupati Valley, South India

Jacob S. Jaya Raj & Shaik Abdul Munaf

Introduction

The origins of prehistoric research in India date back to 1863 when Robert Bruce Foote discovered the first Palaeolith at Pallavaram near Madras (Chennai) (Foote 1866). Since then a number of scholars:- Foote (1984a, 1984b, 1985, 1914, 1916); Cammiade (1924, 1926, 1927), Cammiade and Burkitt (1930), Krishnaswamy (1938, 1947, 1953), Joshi (1955), Seshadri (1956), Ansari (1970), Swami (1976), Pappu (1974, 1981), Subrahmanyam (1975), Paddayya (1976, 1977a, 1977b, 1979a, 1982a), Korisettar (1979) have carried out prehistoric research in South India. In Andhra Pradesh, Soundara Rajan (1952, 1958), Issac (1960), Murty (1966, 1974, 1975, 1979, 1981), Rao (1966), Reddy (1968, 1976, 1978, 1980), Murty and Reeddy (1976), Rami Reddy (1968), Pingale (1970), Rao (1979), Sudarsen (1976), Joshi (1979), Singh (1979), Rao (1979) Singh (1979a, 1979b), Prakash (1981, 1981a), Raju (1981), Naseem (1981), and Kasturbai (1982) have done significant works.

The Study Area

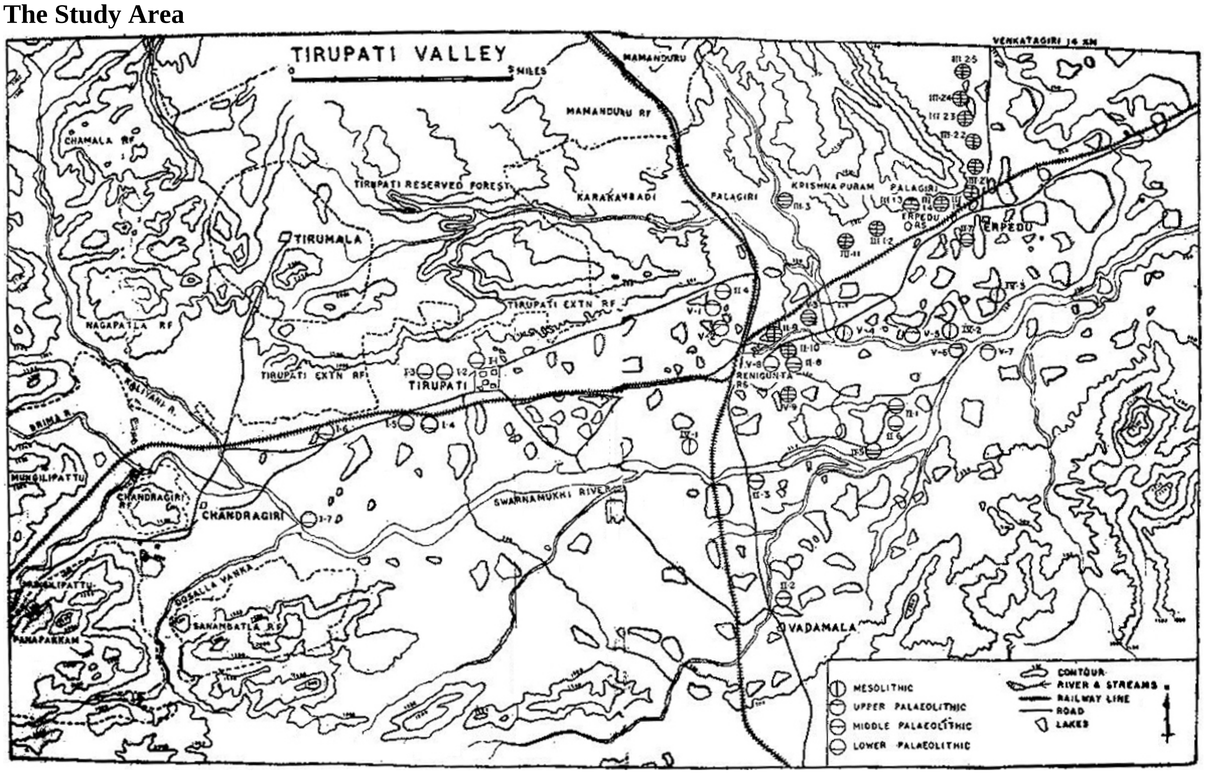


Fig. 1: Map showing Stone Age occupations (sites) in the Tirupati Valley

The research work has been carried out in the Tirupati Valley (fig. 1) of Chittoor district, Andhra Pradesh and submitted to the Poona University for the award of Ph.D. Degree in 1983 (Jayaraj 1983). Tirupati Valley lies between 13° 30' and 13° 45' N latitude and 79° 16' 79° 45' E longitude and covers an area of 800 sq. km. It is bordered by the Seshachalam or Palakonda hill ranges (popularly known as the Tirupati hills, (fig. 2) to the north and the Velikondas to the west. The Sanambatla; the Nagari and the Srikalahasti ranges extend from the eastern to the northern border. Geological formations (fig. 3) of this area consist of Archeans, Eparchean unconformity, Puranas and Quaternary deposits which are considered to be the ancient most land formations in the world. The main soil type is red sandy loam. The valley is drained by the Swarnamukhi (originating in the Adineyapalli reserved forest at 750 m AMSL) and flowing in northeasterly direction into the Bay of Bengal and its tributaries the Kalyani, the Konamadugu, the Rallakalava, the Isukakalava, Bhima,

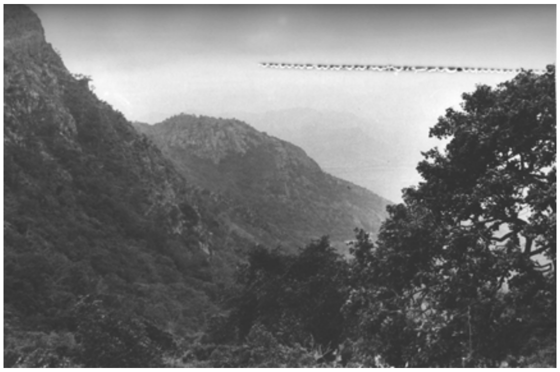


Fig. 2: A glance of flora in the Seven hills, Tirupati, Chittoor district

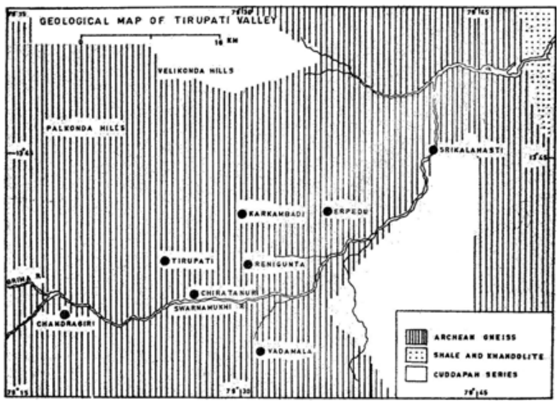


Fig. 3: Geology map of Tirupati Valley

Dosallavanka, Nagapatlavanka, Jarlakona, Vankakona, Vempedu river and several other hill streams. There are as many as 136 lakes in the region between 250 sq. km. (*Manchineellakunta*) to 2 sq. km. (*Rayalacheruvu*) in size with a network of perennial springs and seasonal water falls. The *Aakasa Ganga*, *Papavinasanam Teertham* and *Kapilatheertham* (Fig. 4) being the important ones. The vegetation of the valley belongs to the dry deciduous scrub savannah and tropical thorny types which consist of a variety of floral species. The fauna of this region is very rich with various species of animals belonging to class Mammalia in particular. The mean annual rainfall recorded during 79 years (1901-80) shows a minimum of 400.8 mm, a maximum of 1690.6 mm, and a mean of 877 mm rainfall. The minimum, maximum and mean temperatures of this region are 12.5° C, 44.2° C and 36.50° C respectively.

Aim

The aims of this work are the reconstruction of the Palaeolithic and Mesolithic cultural evolution in the Tirupati valley with the help of the location and distribution of Palaeolithic and Mesolithic sites against the topographical settings, drainage patterns, raw materials, resources, flora and fauna. Analogies of the subsistence strategies and cultural parallels of the Yanadi tribe who are hunter-gatherers and fishers living in and around these sites are drawn to reconstruct stone age life patterns.

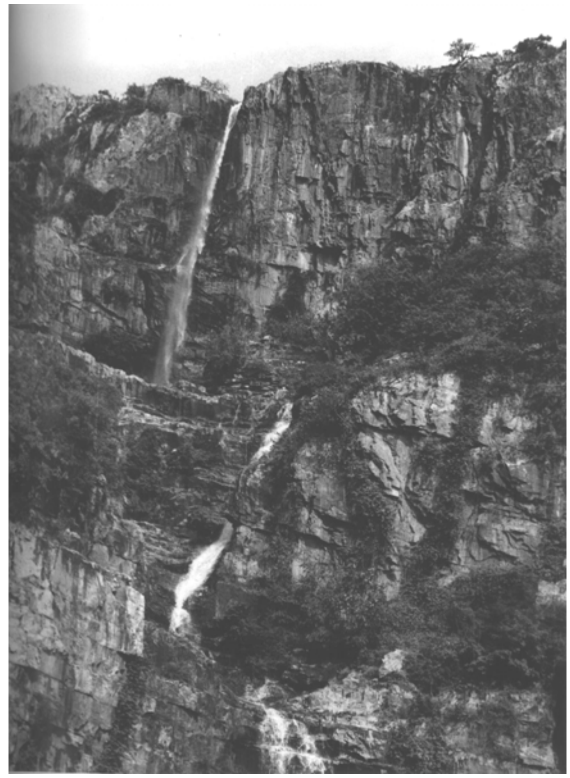


Fig. 4: A seasonal water fall at *Kapilateertham,* Tirupati, Chittoor district

The Methodology

Explorations were carried out along the foothills, streams, lakes, and the plain areas to locate the Stone Age sites. Palaeolithic and Mesolithic sites located in the area are mapped according to their topographical location and distribution.

Stone Age cultural artefacts are analysed in terms of typo-technological methods. This is presented qualitatively and quantitatively by resorting to descriptive, statistical and graphical presentations.

Ethnographic analogy has been used for the reconstruction of Stone Age hunter-gatherers economy. Data on the ethnography of the Yanadis living in the region has been collected by participant observations, interviews and group discussions. A lot of ethnographic data on the

Yanadis has been collected form secondary sources (Raghaviah 1962).

Sites and Stratigraphy

Previous archaeological investigations in Chittoor district (Murty 1966, 1968, 1970) had brought to light stone age occupations – both surface and stratified – belonging to Lower, Middle and Upper Palaeolithic and Mesolithic cultures. The raw materials used for the assemblages of these cultures are coarse to medium grained quartzite for the Lower Palaeolithic, coarse to fine grained quartzite for the Middle Palaeolithic and fine grained quartzite and to some extent lydianite for the Upper Palaeolithic and Epi-Palaeolithic. The Mesolithic assemblages are predominantly on quartz, which is also the chief raw material at several sites elsewhere on the south-east coast of India (Murty 1966; Reddy 1968; and Raju 1981). The evidence from the Tirupati valley corroborates these earlier observations.

Explorations carried out during this study resulted in the identification of primarily surfacial Palaeolithic and Mesolithic occupations in the Tirupati valley. 16 Lower Palaeolithic, 11 Middle Palaeolithic, three Upper Palaeolithic, two Epi-Palaeolithic and five Mesolithic occurrences have been located (fig. 1). Based on the location and occurrence of the sites they are divided into (1) Foothill sites (fig. 5) (2) Lakeside sites (Fig. 6) (3) Streamside sites (fig. 7) (4) Hillslope Sites (fig. 8) (5) Plainland sites (fig. 9).

To ascertain the stratigraphic position of the industries a section has been taken at the Padmavathi Women's College (figs. 7, 10) and a

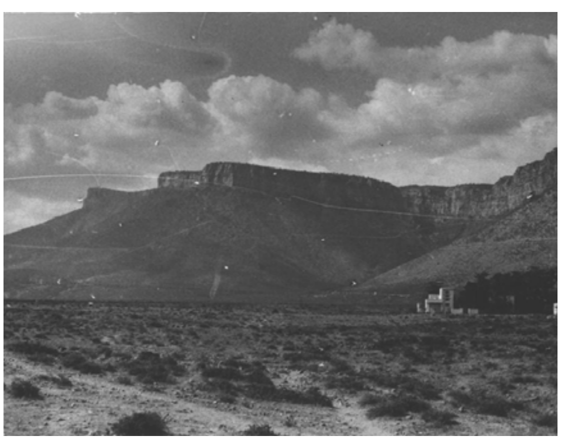


Fig. 5: Locus I.1, where Sri Venkateswara Medical College quarters are now located, Tirupati



Fig. 6: Palaeolithic occurrence at Locus II.10, near Guravarajupalli, Chittoor district



Fig. 7: Locus I.5, A section of stratigraphy near Sri Padmavati Women's College, Tirupati

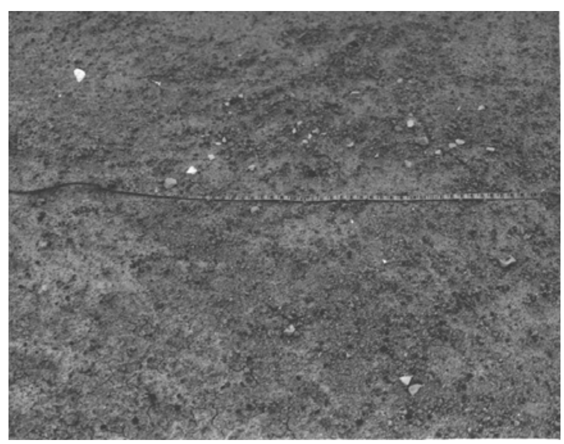


Fig. 8: Mesolithic occurrence at Locus IV.1, near Ottimanugutta, 4km Southwest of Renigunta, Chittoor district

small excavation was conducted at Sitarampet (Figs. 11, 12), a Lower and Middle Palaeolithic workshop-cum-habitation site.

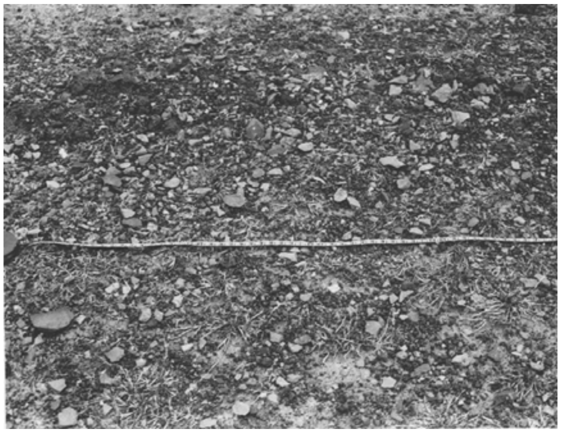


Fig. 9: Locus II.4, A late Acheulian and Middle Palaeolithic occurrence at Karakambadi, near Renigunta, Chittoor district

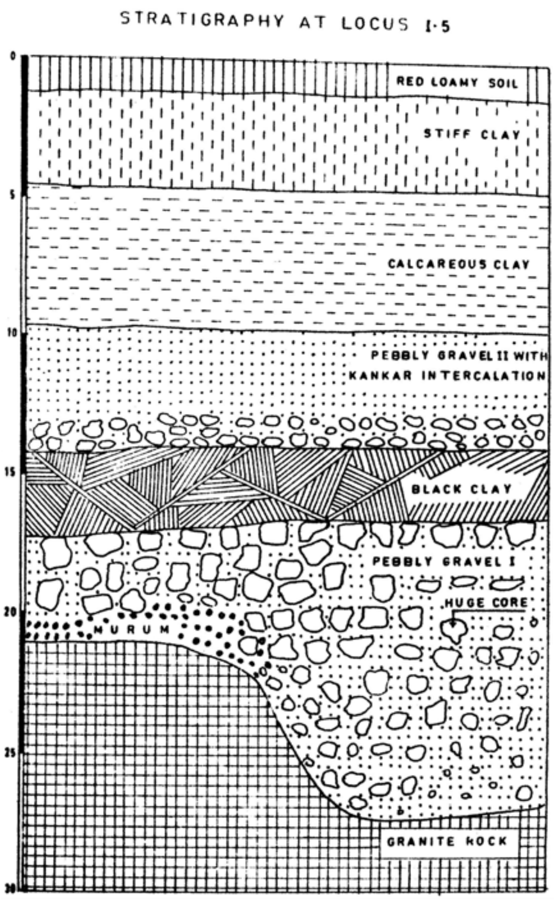


Fig. 10: Stratigraphy at Locus I.5, near TTD, Dairy farm, Tirupati

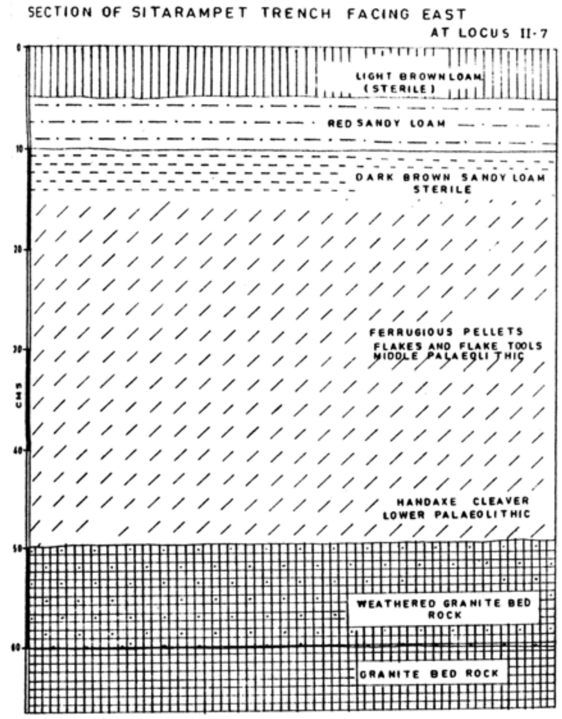


Fig. 11: Stratigraphy at Sitarampet (Stream side site), 15 km from Renigunta, Chittoor district



Fig. 12: Locus II.1, A late Acheulian and Middle Palaeolithic occurrence at Sitarampet, 5 km from Renigunta, Chittoor district

Palaeolithic Cultures

The Lower Palaeolithic occupation occurs in varied topographical settings: the foot hill zones, and in the vicinity of natural ponds, lakesides and stream-sides, and on the low plain areas with a scrub and thorny thicket cover.

The Lower Palaeolithic (figs. 13, 14) is represented at 18 loci and 22 scatters by 2300 (23.34%) specimens. These are classified as shaped (537:23.34%) and simple (1763:76.65%) artefacts. The shaped artefacts comprise handaxes (70-10%), side scrapers (11.35%) and endscrapers (2.97%). The simple artefacts are cores (10.55%), flakes (89.45%) and stone hammers (7) which are not included within the frequency and percentages. The raw material is a coarse to medium-grained quartzite which is abundantly available in the form of pebbles and nodules in river and stream beds as

well as in quartzite outcrops. The tools are basically worked with cylinder hammer technique have symmetrical outlines, straight profiles and biconvex to lenticular cross sections. The majority of handaxes are oval shaped and some of them are pointed with sharp cutting edges all along the periphery. Thin butts were probably meant to facilitate the hafting of handaxes as spearheads; pointed tips but thick pebble butts were probably used for digging roots and tubers. Technologically the Acheulian industry of the Tirupati Valley is more advanced than the industries of Chirki-Nevasa and Hunsgi and can be ascribed to the Late Acheulian of the Tirupati-Renigunta-Gunjana Complex.

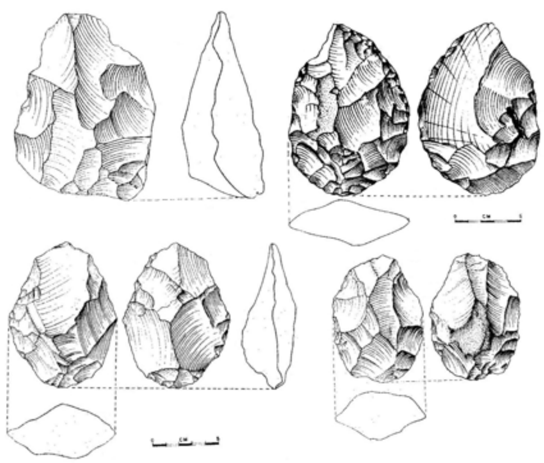


Fig. 13: Handaxes

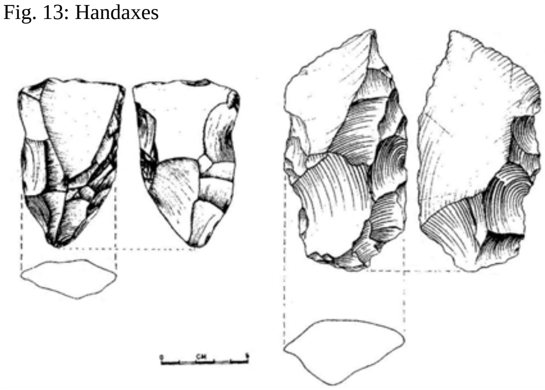


Fig. 14: Cleavers

Metrical analysis of handaxes from eight loci suggests two distinct Acheulian classes: The first one has a predominance of oval-shaped handaxes with cutting edges all around the periphery and is represented by Lakeside and streamside sites. The second category is distinguished by both oval shaped handaxes and implements with heavy butts and broad working ends, and is represented at foothill sites (fig. 14). These two classes are suggestive of different activities as they come from the same site in two different micro-environmental niches, reflecting the modes of exploitation and procurement of plant and meat foods.

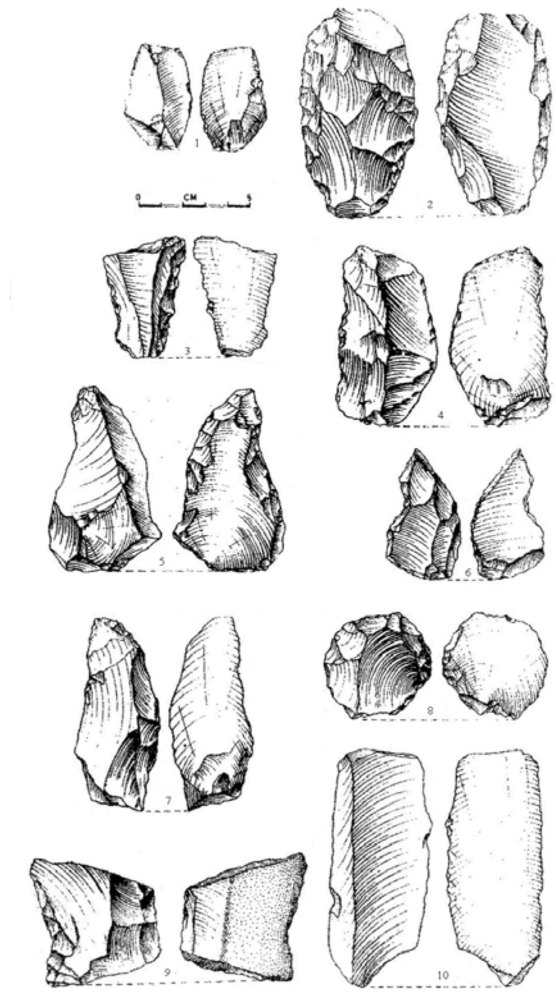


Fig. 15: Blade (1), Blade Scraper (2), Backed blade (3), Pointed blade (4), Blade tool (5), Blade points (6), Burin (7), Cores (8), Broken blades (9), backed blade (10)

The Middle Palaeolithic occurrences (Fig. 15) belong to 11 loci and 15 clusters and amount to 1471 specimens, these are classified as shaped (362:24.61%) and simple (1109:71.39%) artefacts. The shaped artefacts comprise miniature handaxes (1.63%), cleavers (0.40%), side scrapers (14.62%), denticulates (1.76%), end scrapers (0.88%), end-cum-side scrapers (0.63%), notches (0.67%), points (0.33%), borers (0.67%). The simple artefacts are flakes (54.53%), and chips (11.09%). The flake blanks are produced from prepared cores (9.80%), without faceted platform as well as from simple cores. Miniature handaxes and points on cores

reveal thin and shallow scars and bifacial retouch, suggesting the continuity of Late Acheulian bifacial techniques in a refined form. The Middle Palaeolithic industry in the Tirupati valley displays close affinity to quartzite based industries in different river basins of the southeast coast like the Sagileru, the Penner, the Gunjana, the Paleru and the Gundlakamma.

The evidence for the Upper Palaeolithic (fig. 16) and Eip-Palaeolithic comes from five loci and 13 scatters. The industry comprises 2342 specimens which includes (412: 15.59%) shaped and (1930: 82.41%) simple artefacts. The shaped artefacts include nine types, side scrapers (41.09%), denticulates (2.18%), notches (5.82%), knives (24.25%), back blades (9.45%), crescents (17.03%), burins (7.76%), borers (0.97%), and pointed blades (1.45%). The simple artefacts are cores (15.44%), blades (33.38%), including complete blades (12.12%), and broken blades (23.16%), and microblades (1.54%), which also include complete type (0.25%), and broken type (1.29%), flakes (37.56%), and chips (10.15%). The industry is based on blade tool technology and consists predominantly of scrapers and backed variants made on fine-grained quartzite and lydianite.

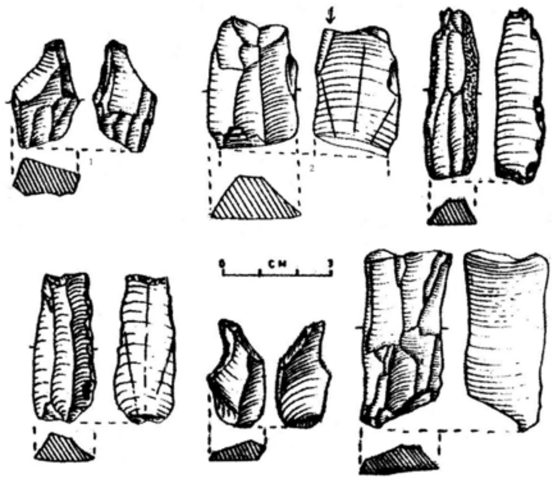


Fig. 16: Microblade point (1, 2), Blade tool (unnumbered)

Various types of scrapers are likely to have been used for processing wood, hide and bone for making hafts and wooden implements. The backed types were probably used as composite tools for barbed arrowheads, harpoons, slicer knives and inserts for fish hooks. The predominance of backed points in Upper Palaeolithic, viewed in the content of central Indian Mesolithic rock paintings, corroborates the above mentioned observation.

Mesolithic Cultures

The evidence for Mesolithic (fig. 17) comes form five loci and 14 scatters. These are located on the hill slopes as well as the plains of the valley and are closer to the Swarnamukhi river than the sites

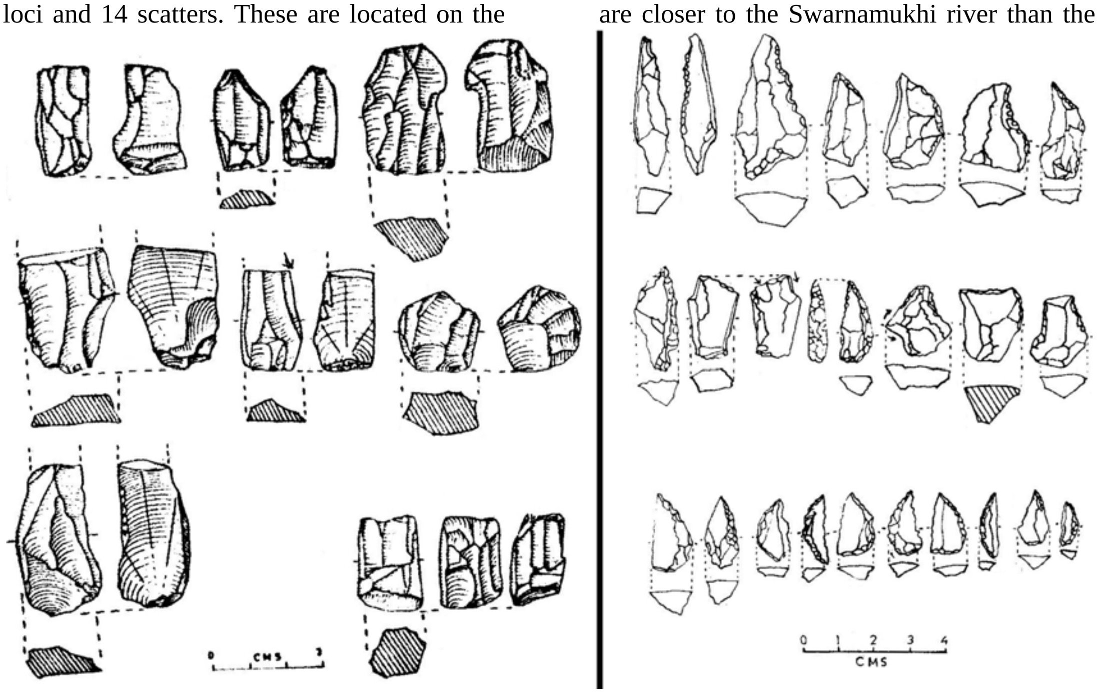


Fig. 17: Microliths

of various Palaeolithic cultures. They occur on patches of uncultivated land in the thorny thicket jungle with grass cover and on stretches of barren rock surfaces.

The industry comprises a total of 2297 specimens of which 322 (14.32%) are shaped tools and 1975 (85.98%) are simple artefacts. The shaped artefacts of microliths include retouched blades (5.74%), truncated blades (3.68%), blunted back blades (47.14%), blunted and oblique retouched blade (4.92%), points (14.34%) and crescents (24.17%). Similarly shaped tools on flakes include single side scraper (56.40%), double side scraper (7.69%) and scraper (10.25%), denticulate (7.42%), notch (5.13%), knife (6.42%) and burin (7.69%). The simple artefacts include cores (23.53%), flakes (14.31%), blades (33.99%) and chips (28.16%).

The Mesolithic industry is predominantly of a non-geometric type and is strikingly similar to the quartz microlithic industries of the southeast coast.

Ethnoarchaeology of Yanadi

Ethnoarchaeological work has been carried out on the Yanadis inhabiting in and around Tiruapti valley in a similar manner to Murty (1978-79, 1981), Murty and Sontheimer (1980) and Raju (1981). Their settlements are located just in and around the same sites which might have been occupied by the Upper Palaeolithic and Mesolithic hunter-gatherers (figs. 18, 19). This ethnography for archaeology helped a lot in understanding the ethnographic parallels and analogies with the prehistoric subsistence and adaptation patterns of this region. The Yanadis of this region practice traditional hunting, gathering, fishing and fowling activities. Because of contacts with the neighbouring villages and urban areas Yanadis are also working as agricultural labourers and as watchmen in the fields of agriculturists. Yanadis live in traditional circular huts (fig. 19) with conical roofs made of plant materials.

The Yanadis living in this area have very good local knowledge about their surroundings particularly of medicinal plants and animals which are important for their subsistence. Even though hunting is prohibited Yanadis hunt small game particularly rabbits, squirrels, porcupines, wildcats, rats, monitor lizards, bandicoots and langur monkies. They also catch a variety of birds. Yanadis fish for a variety of fresh water fish using different methods like fish traps, wires, nets and hooks. The Yanadis are adept at gathering roots, tubers, yams, different edible leaves and a variety of fruits. They also earn money by selling minor forest produce and now and then they also barter these items for rice.



Fig. 18: The Yanadi settlements in front of the Palaeolithic occurrence near Yerpedu, Chittoor district



Fig. 19: Yanadi standing in front of a conical hut near Yerpedu, Chittoor district

The Yanadis are very familiar with different varieties of medicinal plants and their applications. The Yanadi medicine man treats various disease with the available medicinal plants in their hamlets. They have a complete knowledge of the flora, fauna and environmental changes of this region. The ethnographic study of the Yanadis gives a very good understanding of how the Prehistoric populations inhabiting the Tiruapti valley area was exploiting the flora and fauna of the region. Ethnoarchaeology of the Yanadis provides excellent analogies for predicting the way of life at least during the Upper Palaeolithic and Mesolithic times.

Scope for further Research work in the Tirupati Valley:

By keeping in mind the nature and the distribution of prehistoric sites in the Tirupati Valley one can carryout further research work by following multidisciplinary approaches and by applying advanced archaeological (Loy 1993; Fiedel 1996; Hardy 1997; Hiscock and Clarkson 2000; Renfrew and Boyle 2000; Fanning and Holdaway 2001, McNabb *et al*. 2004) and ethnoarchaeological (David and Kramer 2001; Kimura *et al*. 2001) research methods including the work done on set of artefact variable (i.e. artefact size, distribution, artefact rounding, patination, weathering) (Paddayya and Petraglia 1993). Artefact refitting work can be carried out to examine the meaning of patterns on horizontal surfaces and sequences of lithic reduction .

Microwear analysis which will help to know the aspects of tool function, subsistence and activity can be applied, to understanding Pleistocene palaeoecology and hominid behaviour work can be carried out as was done by Misra and Rajaguru (1989). Excavations of the Cave sites discovered in this area can be conducted for detailed studies like that of (Misra 1973, 1978b; Murty 1974; Reddy 1976). Site formation research can be done, as has been extensively done by S. Pappu (1997, 1999, 2001a, 2001b, 2004) at Attirampakkam.

If we see the nature type of Stone Age sites in Andhra Pradesh (Murty 2003), most of the palaeolithic and mesolithic sites are surface sites (360, 81%). Stratified sites are few (69, 15%) (Lower Palaeolithic: Surface sites-103, Stratified – 24, River bed-5, River bank-1, Terrace-7 sites; Middle Palaeolithic: Surface sites-139 Stratified – 26 sites; Upper Palaeolithic: Surface sites-61, Stratified-13 sites; Mesolithic: Surface sites-57, Stratified-6). Among these very few have been excavated.

In this context we can opt for 'surface archaeology' as an alternative as it is rightly pointed out by Alan P. Sullivan III (1998) that "Bronislaw Malinowski's (1926) high-quality fieldwork, or "Open-air anthropology" boosterism would seem appropriate today for the study of surface sites (archaeology) and its interpretive potential. Anthropological Archaeologists typically examine variability in the archaeological record and asses its implications for inferring aspects of the cultural past. Surface archaeological phenomena have intrinsic interpretive potential that largely has gone unexplored. Surface archaeological phenomena neither depends upon nor derives from characteristics of subsurface archaeological phenomena (Ebert 1992). Mystifying subsurface archaeological patterns can be clarified only after an exhaustive study of the surface material. Interpretive potential of surface phenomena is affected by the degree to which their origins can be ascertained reliably (Lewarch and O'Brien 1981:298). If indeed there are limitations in the interpretive value of surface archaeological phenomena, then those limitations need to be demonstrated analytically rather than simply assumed.

It is believed that archaeological sites now buried were once surface scatters (Dunnell and Dancey 1983). As ethnoarchaeology of hunter-gatherers proved that their camps are spatially extensive even thousands of square meters (Yellen 1977; O'Connell 1987) and excavations of this magnitude are beyond the scope of most archaeological research (Fanning and Holdaway 2001). In this situation archaeologists are turning to surface artifact scatters as a way of assessing human impact at the landscape level because such scatters are the most ubiquitous part of the archaeological record in many parts of the world (Sullivan 1998; Rossignol and Wandsnider 1992). In this context Surface Archaeology is the alternate way for young scholars pursuing Palaeolithic archaeology in the 21st century in India.

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Table 1: Table showing classification of sites, Locus, Scatters, Location of loci or sites, Types, of artefacts collected from Tirupati Valley:

Sl. No.	Classification of sites	Locus	Scatter	Location of the Site	Prehistoric Cultures (artifacts)
1.	Foothill sites	Locus-I		S.V. Medical College, Tirupati	LPC, Choppers, Acheulian Handaxes, Cleavers, Discoids, Flakes, Scrapers,
		Locus – II		S.V. Arts College, Tirupati	LPC, Choppers,Acheulian Handaxes, Cleavers, Discoids, Flakes, Cores
		Locus-III	S - I	S.V. University College, and A-Block, Tirupati	LPC, Mostly Falkes
			S – II	S.V.U. Girls Hostel	LPC, Flakes
			S – III	S.V.U. Library	LPC, Acheulian Handaxes, Flakes and Cores
			S – IV	S.V.U. Arts Block	LPC, Flakes and Cores
			S – V	D.D.E. Building	LPC Choppers, Handaxes, Cores, Flakes
		Locus –IV		Sri Padmavati Women's College, Tirupati	LPC, Choppers, Acheulian Handaxes, Cleavers, Flakes, Cores
		Locus – V		TTD Dairy Farm, Tirupati	LPC, Acheulian Handaxes
		Locus – VI		Pudipetla Village near Tirupati	LPC, Acheulian Handaxes, Cleavers, Flakes and Cores
		Locus– VII		Sanambatla hill slope, near Tirupati	LPC, Choppers, Acheulian Handaxes, Flakes
2.	Lake side sites	L – I		Igitimala Lake, near Renigunta	LPC, Choppers, Acheulian Handaxes, Cleavers, Notched flakes
		L – II		Vadamalapet Lake, near Gajulamandyam Village	LPC and MPC, Acheulian Handaxes, Flakes
		L – III		Vadamalapet Lake, near Gajulamandyam Village	Late Acheulian artifacts, and Middle Palaeolithic flakes
		L – IV		Karakambadi Village Lake, near Renigunta	Late Acheulian artifacts, and Middle Palaeolithic flakes
		L – V		Papanaidupeta lake, near Papanaidupeta	Late Acheulian artifacts, and Middle Palaeolithic flakes
3.	Stream side sites	L – VI		Vankakalava, near Sitarampeta	LPC, Handaxes, Cleavers, Cores, Flakes and MPC
		L – VII		Sitarampeta – Venkatapuram lake, near Yerpedu 15 km from Renigunta	MPC, Flakes, Flake tools, Cores
		L - VIII		Airport, near Renigunta, Tirupati	LPC, Choppers, Acheulian handaxes, Cleavers, Scraper, Massive flakes MPC, Miniature bifaces, Scrapers, Flakes, Chunks, cores, Shouldered Point (Tanged point), Levallois points
		L – IX	Scatters (1-5)	Isukakalava, Electric Substation near Renigunta	LPC, Choppers, Acheulian handaxes, MPC, Flakes, Scrapers, UPC, Blades, Microliths – Flakes, Lunates, Points, Scrapers, Fluted cores, Blades
		L – X	Scatters (1-5)	Guravarajupalli, near Renigunta	LPC, Acheulian handaxes, Middle Palaeolithic flakes, UPC, Blades, Scrapers, Notched scraper, Cores

4.	Hillslope sites	L – I	Scatters (1-3)	Merlapaka lake, Yerpedu Leprosy Centre, Yerpedu	LPC, Choppers, Handaxes, Cores, MPC, Flake tools, Blade tools, Microliths
		L – II	Scatters (1-4)	Yerpedu Ashram, Konamadugu gorge, Yerpedu	Late Acheulian artifacts, MPC, Fakes, Flake tools UPC, Blades, Knives, Blade-Scrapers, notches, Cores, Microliths – flakes, blades, Lunates,
		L – III	Scatters (1-3)	Leprosy Centre, near Vempedu Village, Yerpedu	UPC, Blades, Blade tools, Microliths
5.	Plainland sites	L – I		Ottimanugattu, Soutwest of Swarnamukhi river, 4 km from Renigunta	Microliths – Flakes, Flake scrapers, Lunates, Points, Microburin, Cores
		L – II		Madhavamala, near Renigunta	Microliths – Flakes, Scrapers, Blades, Lunates, Backed blades
		L – III		Kobaka Village, near Renigunta	Microliths – Blades, Backed blades, Points, Cores
		L – IV		Yerpedu	Microliths – Flakes, Scrapers, Blades, Lunates, Cores

LPC = Lower Palaeolithic Culture, MPC = Middle Palaeolithic Culture, UPC = Upper Palaeolithic Culture

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Early Settlement Patterns in Cuddapah District, Andhra Pradesh

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This paper summarises the investigations on Palaeolithic sites and ethnography in the Gunjana valley, Cuddapah District carried out between 1976 and 1980. This research formed the basis for my Ph.D. dissertation submitted to University of Poona (Raju 1981).

Right from the time of Robert Bruce Foote (1916) Indian prehistorians have concerned themselves with the building of stratigraphic sequences and establishing typo-technological parameters for lithic assemblages. As a result, the broad outlines of Palaeolithic culture sequence are fairly accurately known for most parts of the country (Sankalia 1974; Misra and Bellwood 1985).

Although a number of Mesolithic habitations have been excavated since 1940, majority of the Palaeolithic sites investigated were archaeological occurrences in geological contexts like river alluvia, laterite, and loessic deposits or open air factory sites. Very few primary sites where data on living patterns of Stone Age populations can be expected had been excavated. However, an awareness of this shortcoming has developed and several archaeologists are now investigating primary Palaeolithic sites in different parts of the country. Among the studies in this category mention should be made of the excavations of multi-culture deposits in the rock shelters of Adamgarh (Joshi 1966, 1977), and Bhimbetka (Wakankar 1973; Misra 1976, 1978; Misra, Mathpal and Nagar 1977), open air Acheulian sites at Chirki (Corvinus 1981, 1983) and Hunsgi (Paddayya 1982) and the study of surface Acheulian occupations in Central India (Jacobson 1985). Investigations into the Upper Palaeolithic open air occupation sites of Renigunta (Murty 1985), the open air site at Patne in Jalgaon district of Maharashtra (Sali 1985) and lake side Late Upper Palaeolithic occupations in Allahabad and Pratapgarh districts of Uttar Pradesh (Sharma *et al.* 1980) are noteworthy. Thus, the emphasis is now shifting from generalised surveys of large areas to excavation or intensive studies of primary buried or surface sites.

The goal of Palaeolithic archaeology is to understand the behavioural patterns of the Pleistocene human groups. However, unlike in Africa, parts of Central Asia and Middle East where Palaeolithic sites present ample evidence in the form of Palaeobiological remains and dwelling structures so essential for reconstruction of past behavioural patterns, even the few excavated primary Palaeolithic sites in India are devoid of human skeletal remains and in most cases even of animal fossils. Despite these limitations, Indian prehistorians are investigating primary sites and endeavouring to interpret settlement systems, subsistence strategies and paleodemography of Stone Age sites (Paddayya 1982; Murty 1985; Misra and Murty 1986).

One important approach to gain insights into the prehistoric life patterns is to study the present day non-industrial populations (Stanislawski 1974: 18; Yellen 1977) of the area under investigation as an aid to get clues as to the probable use of the ecosystem by the Stone Age hunter-gatherers. This has been variously termed as Palaeoanthropology (Woodal 1978). Living Archaeology (Gould 1980) and Ethno-archaeology (Stiles 1977). A number of studies have been undertaken with this approach in Africa, North America and Australia. A beginning in this field has also been made in India (Leshnik 1964; Nagaraja Rao 1965; Nagar 1967, 1975; Murty 1981,1985; Murty and Sontheimer 1980; Paddayya 1982) although majority of the studies so far undertaken are concerned mainly with the late stages of prehistory.

As a part of this approach, I have undertaken an investigation of a restricted area in the Cuddapah region in southeast India to build a predictive model for the settlement pattern and subsistence adaptations of Palaeolithic hunter-gatherers on the basis of archaeological, ecological and ethnographic data. I have discovered extensive Palaeolithic occupation sites which although surfaicial yielded evidence relevant to an understanding of settlement patterns. For interpreting settlement and subsistence patterns, I conducted an ethnographic study of the Yanadis, who are traditional hunter-gatherers living in the same area. The ethnographic data from a primitive group who continue to exploit the same ecozones that were inhabited during the Stone Age has been used for interpreting the archaeological evidence. I am, however, aware of certain limitations in the present work. Paucity of funds and to a certain extent constraint of time prevented me from

undertaking a large excavation of occupation sites. A small trial dig was, however, made at one of the Upper Palaeolithic habitation sites to confirm the cultural chronology.

In the area studied by me the evidence for the Upper Palaeolithic period is more prolific than for other periods. The emphasis of the present study is, therefore, mainly on the Upper Palaeolithic and it is primarily concerned with reconstruction of settlement patterns of the Terminal Pleistocene hunter-gatherers.

The concept of settlement pattern and its application in archaeology is essentially of American origin although it is difficult to ascertain the first use of the term (Chang 1972: 1). American ethnologists like Lewis H. Morgan (1881) and Mindeleff (1900) were interested in the study of the aboriginal habitation and architecture and the pueblo ruins in the American southwest and their distribution over the landscape as far back as a century ago. However, as a focussed methodological concept of archaeological research the settlement pattern was brought to the forefront by the combined efforts of Julian H. Steward, an ethnographer at the Bureau of American Ethnology at the Washington D.C. and his archaeologist colleague Gordon R. Willey (1953) in a study of the archaeology of the Viry valley, Peru. Since then and especially over the last two decades, this concept was applied by several archaeologists. Anthropologists distinguish two types of settlement patterns namely, (1) complete settlement patterns and (2) remnant settlement patterns (Rouse 1972: 97).

Complete settlement patterns

This encompasses the study of the placement and spacing and the arrangement of the dwelling structures of a human social group in relation to other architectural features like temples and ceremonial centres, their material culture, the resource base, technology and exploitative pattern, social organisation and ideology or the belief system and the interrelationships of all these to the immediate physical environment. With regard to the interrelationships of different settlements and components of settlements, the people are the centre of attention, "people" whose activities at these loci give meaning to the interrelationships. This type of study is possible only in living communities where the "people" is a given and are studied by social anthropologists and geographers.

Remnant settlement patterns

This is the study of the reconstruction of settlement patterns with the help of the traces of material remains which survived the ravages of time. These are found in the form of sites and traces of activities performed on them. If only a single activity was performed at a site it may be referred to as an activity locus. If several different activities tool place at the site as is normally the case at habitational sites, the site can be divided into several activity loci (Binford 1964: 424). Hence an activity locus may be defined as any spot where a minimum number of activities took place (Rouse 1972: 152). To recover the surviving traces of an activity pattern, a prehistorian must first find loci covering the entire range of a peoples' activities and then collect remains from representative loci. The remains obtained from each locus may be referred to as an "activity assemblage" (Rouse 1972: 152). Thus, a network of activity loci are obtained in the form of prehistoric sites. The combination of activity loci together with an activity assemblage from each locus constitutes a remnant activity pattern. The remnant settlement pattern consists of the location of the entire range of a people' activity loci, collection of remains from representative loci and assessment of the possible relevance of the relationships within and between the sites in a given geographical zone in a delineable time period. It is the remnant settlement patterns that are pertinent to the archaeologists who have to deal with ruins of settlements and remains of past activities that accumulated during a period of time that may be long or short.

In technologically simple societies two broad classes of activities namely extraction and maintenance can be distinguished. The former involves the direct procurement of foods, fuels and raw materials for tools and the latter consists of the preparation and distribution of foods and fuels already on hand and in the processing of raw materials into foods. The camps where these activities are performed are the "settlement types". These are classified into three basic categories (Binford and Binford 1969).

Base Camps

These are chosen mainly for living space, protection from the elements and central location with respect to resources.

Work Camps

These are sites occupied by smaller social units for carrying out extractive tasks. Archaeologically these would appear as kill sites, collecting stations and quarries for extracting raw materials to be used in tool making. The archaeological assemblages form these sites would be dominated by the tools used in specific extractive tasks. If a work camp were occupied for a rather long period and by a fairly large group, some maintenance activities would also be reflected in the archaeological remains.

Transient Camps

These sites contain minimal evidence of maintenance activities such as might be undertaken by a travelling group in the course of an overnight stay.

The way these classes of camps are used by any society defines its "settlement system". In the light of the foregoing, attempts are made to evaluate the Stone Age occupation scatters for an appraisal of settlement patterns.

A brief account of the previous work in the area, the present study area, methods adopted for this study and the present environment of the region are given in the pages that follow.

Present Investigations

Systematic investigation of the prehistory of Cuddapah region began only in late sixties when K.T. Reddy (1968) explored Sagileru valley and its tributaries and a general survey of other river valleys and reported several Stone Age sites (fig. 1). Before that only isolated discoveries of prehistoric artefacts had been made (Raju 1981).

The present study is confined to Gunjana valley, a tributary of the Cehyyeru in the cuddapah region. The river Gunjana originates in the Seshachalam reserve forest (13° 47' N; 79° 17' E) at 1035 m above sea level and flows through a longitudinal valley (leghth about 85 km) in the Velikonda hill ranges during the course of which it is joined by several affluents and hill streams and ultimately merges into the river cheyyeru (14° 51' N; 79° 16' E at 95 m above sea level).

This work aims at the reconstruction of the Stone Age settlement patterns in the Cuddapah region with the help of location and distribution of sites of the different stages of the Palaeolithic against their topographical setting, water sources, raw materials, flora and fauna, and by drawing inferences from the subsistence strategies and settlement patterns of the present day hunter-gatherers living at and around these sites (fig. 2).

Explorations for stone age sites and ethnography were carried out for a period of thirteen months. They resulted in the discovery of nine Acheulian, two Middle Palaeolithic and ten Upper Palaeolithic sites. Artefact collections were made from seven Acheulian, two Middle Palaeolithic and three Upper Palaeolithic sites. The number of sites for collection of artefacts was intentionally restricted because the sites, especially those of he Upper Palaeolithic were unusually rich and it would have been unmanageable to handle the artefact collections from all the discovered sites. Also, when material from several sites appeared to be homogeneous, it was considered unnecessary to make collections from all such sites. The collection of material from Acheulian and Middle Palaeolithic sites was selective as the artefacts from these sites were not too numerous and also spread randomly over wider areas. Artefacts from three Upper Palaeolithic habitation sites were collected by making grids and analysed in terms of 'activity loci' and 'assemblages'. Inferences from the study are extended to other similar sites to assess possible relationships within and between the sites (constituting remnant settlement patterns). A trial dig was made at 'Vodikalu', one of the Upper Palaeolithic habitation sites to confirm the cultural chronology established on the basis of surface collections.

Methodology

The following methods have been used for the present study:

1. Newly discovered, Stone Age sites have been mapped to show their location and distribution.
2. Stone Age cultural material has been analysed in terms of typology and technology and the morphometric analysis has been presented in the form of tables, and frequency polygons.
3. To reconstruct Upper Palaeolithic settlement patterns, three habitation sites were chosen for an analysis of variability within the sites. Each of these sites has been divided into several loci based on spatial density and extent of the distribution of artefacts. Each locus has been divided into several squares and all the artefacts were collected from randomly selected squares. The variability is then assessed by comparing the

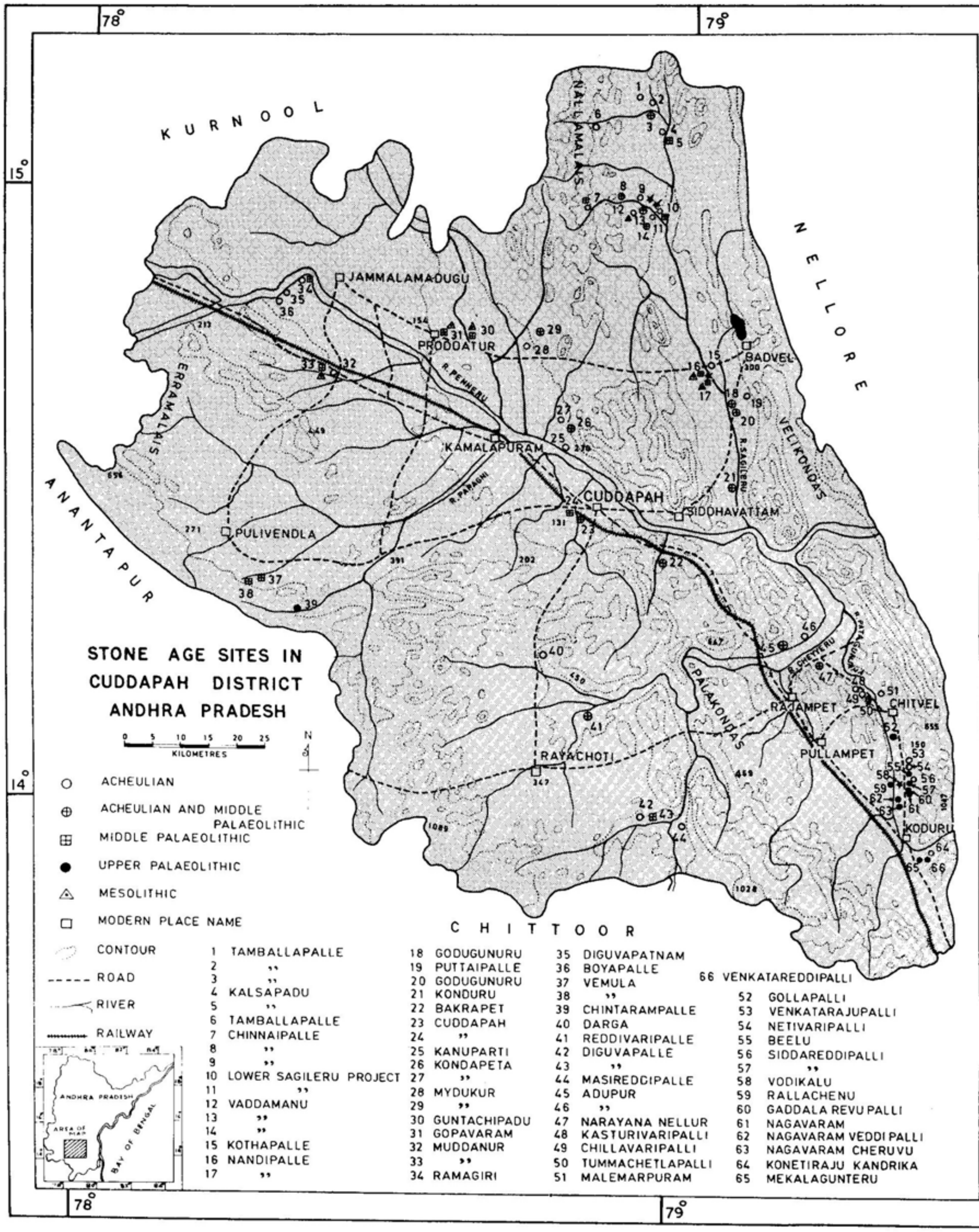


Fig. 1: Stone Age Sites in Cuddapah District, Andhra Pradesh

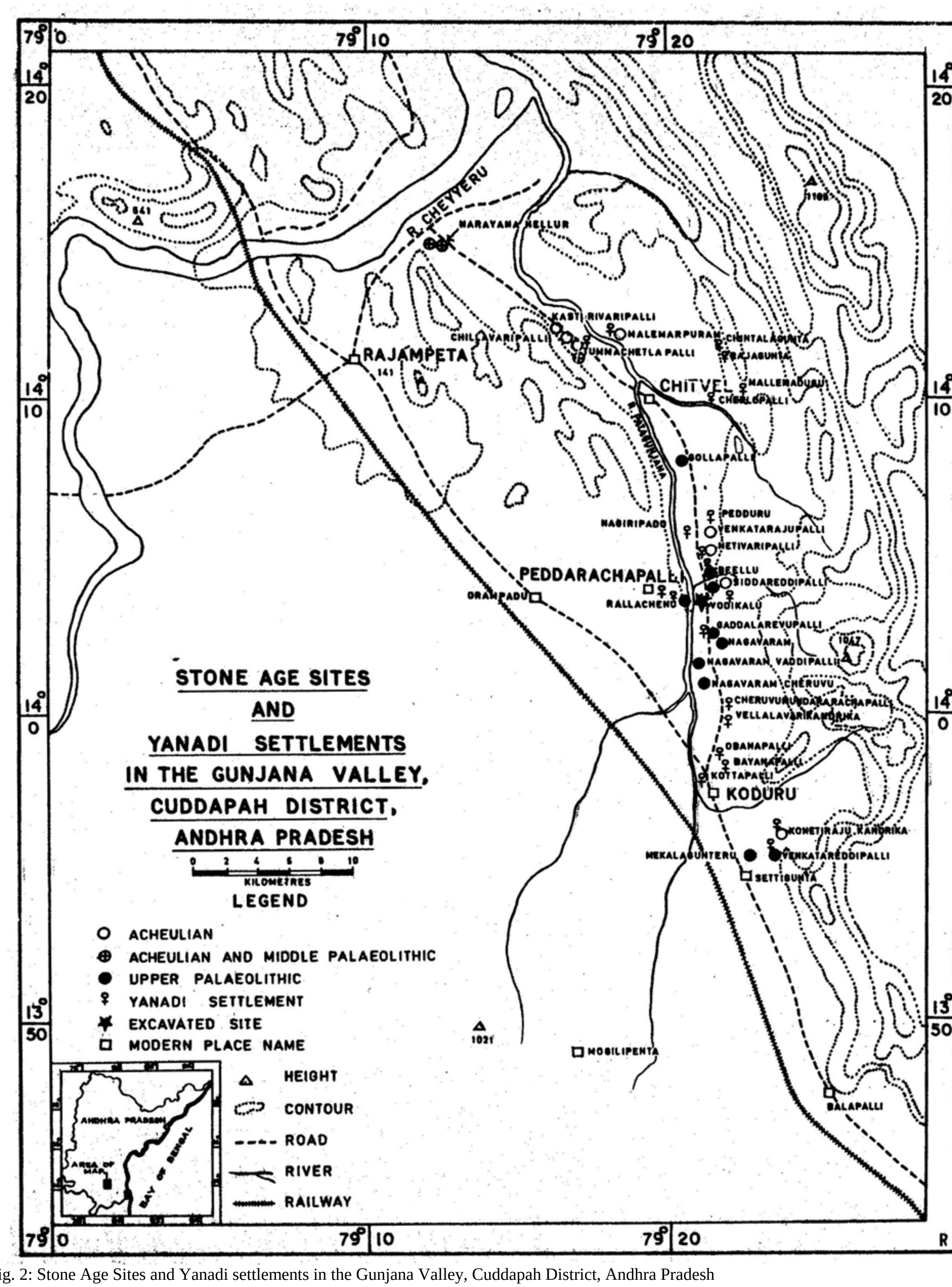


Fig. 2: Stone Age Sites and Yanadi settlements in the Gunjana Valley, Cuddapah District, Andhra Pradesh

distribution of artefact types and differences in their dimensions.

4. Functional attributes are assigned to specific tool categories on the basis of documented ethnographic evidence (Mulvaney 1976: 84), experimental results, and microwear analysis of stone tools carried out in other parts of the world (Keeley 1979: 102-109). It is necessary first to relate stone tools o human activities and then to determine how these tools were distributed at different sites in order to assess the relevance of the settlement system for Palaeolithic hunter-gatherers (Binford and Binford 1969: 94-95). It is presumed that the variability in the distribution of stone tools reflects the variability in human activities.
5. Ethnographic evidence has been used to reconstruct Palaeolithic settlement patterns. Data on the ethnography of the Yanadi hunter-gatherers has been collected by the following methods:
   i) Interviewing the Yanadi men and women, especially of the older generations who were expert hunters and gatherers during their active life.
   ii) Participating in hunting and fishing expeditions of the Yanadis and collecting first hand information on their subsistence strategies.
   iii) Use of historical documents, census reports, district gazetteers, district manuals and statistical abstracts.
   iv) Use of published and unpublished ethnographic accounts, monographs and field reports on the primitive peoples of the region.

Environment

To understand the culture historical processes that had gone on in the study region in its proper perspective, it is necessary to understand its ecological setting to know the potential and use of resources and human-biosphere interaction. The availability and distribution patterns of the raw materials for tools, wild plant and animal foods for subsistence, the vagaries of weather and the effects of the fluctuating climate during the Pleistocene are crucial for understanding early human adaptations.

The Cuddapah region is located in the heart of Rayalaseema of Andhra Pradesh, South East India, between 13° 43’ and 15° 14’ N latitude and 77° 55’ 79° 29’ E longitude. Physio-graphically it can be divided into three natural divisions – the Western Plains, the Eastern Valley and Southern Plateau (fig. 1). The main physical features of the region are determined by its hill ranges. Barring the Tribal or Agency tracts in Srikakulam, Visakhapatnam, Godavari, Khammam and Warangal Districts, Cuddapah is he most hilly region in Andhra Pradesh (for details see Raju 1981). Geologically it is a stable land mass having some of the oldest rock formations on Earth – Archaeans, Puranas, Cuddapah and Kurnool super groups (fig. 3). Lithologically, the main rock formations are quartzite and shale. The other rocks are Shale and Limestone confined to a small area in the northern part, a tiny patch of older trap in the north-western part and Gneissic complex in the mid-western part of the region (fig. 4). The abundance of quartzite which is one of the best raw materials for stone tools is a key factor for its selection by Stone Age human groups.

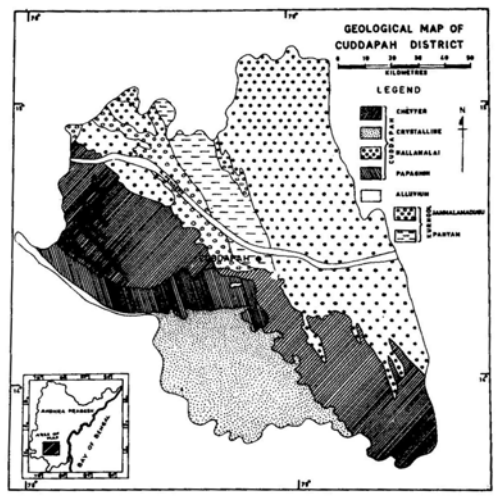


Fig. 3: Geological map of Cuddapah District

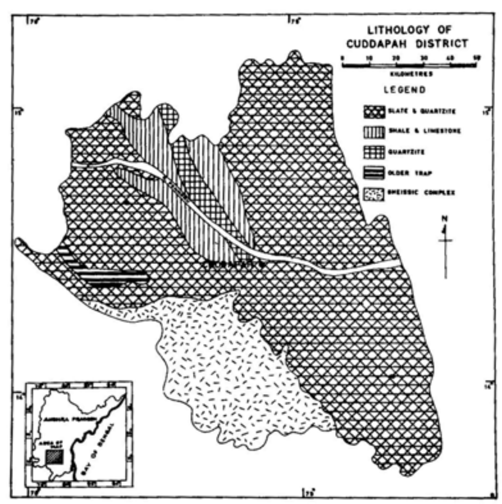


Fig. 4: Lithology of Cuddapah District

The soils of this region consist of red sandy soil (27%), red loam (25%), black clay (24%) and black loam (18%) (fig. 5). This region is drained by the Penneru and its tributaries namely the Chitravati, the Kunderu, the Papaghni, the Sagileru and the Cheyyeru. Gunjana valley, which is the main focus of the present study is an important tributary of the river Cheyyeru.

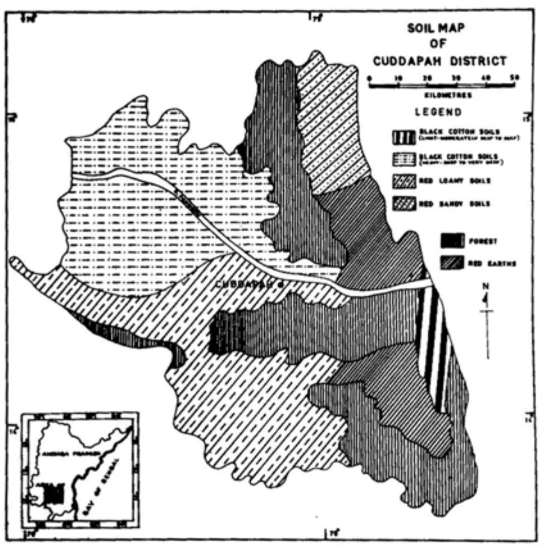


Fig. 5: Soil map of Cuddapah District

The Gunjana

The name is a corrupted form of ‘Kunjareru’. ‘Kunjara’ in Sanskrit means ‘elephants’. The locality where it starts was in the earlier the habitation of wild elephants, and hence the name. This river rises in the southestern corner of Kodur taluk near Mogilikuppa (1052 m above sea level) in the Seshahalam hills. It courses through the hills beyond Netikuppa and falls down 78m. These falls are about 7 km to the west of Settigunta. About 5 km to the west of Settigunta railway station the Gunjana descends down the Seshachalams and the Velikondas in the Kodur valley. Meandeing northwards it collects the Gundlavanka on its right bank and continuing beyond Kodur it receives Mushtiyeru on its left back. Flowing further north, the river collects on its left flank its bigges affluent, the Gundaleru to the northeast of Anantarajupeta. Then it sweeps northwards into the fertile Chitvel valley between the Velikondas and the Chitvel hills collecting many hill streams like Gottimanikona nad Aluguvanka. The Ellamarajucheruva is formed by damming Gundalakona and other hill streams. Approaching Chitvel, the Gunjana or Patagunjana turns northwest and winds along some projecting hills of the Velikondas and with a sweep to the northeast merges with Cheyyeru near Pottapi village (94 m above sea level). The Koduru and Chitvel valleys of the Koduru Taluk are drained by this river.

Climate

The annual climate cycle of the Cuddapah region consists of four seasons. The period from December to February is dry and comparatively cool. The summer season is from March to May and is followed by the southwest monsoon season from June to September. October and November constitute the post monsoon season.

The average annual rainfall in the region is 700 mm. The rainfall generally increases from northwest to south-east part of the region. The rainfall is mostly confined to he months of May to November. Highest rainfall occurs in September. The annual rainfall shows variations from year to year. In the fifty year period from 1901 to 1950, the highest annual rainfall amounting to165 per cent of the normal occurred in 1903. In the very next year 1904, the region had the lowest rainfall in the fifty year period which amounted to 49 per cent of the normal. In ten years out of the fifty, the annual rainfall was less than 80 per cent of the normal. The rainfall was between 400 and 900 mm in forty-two years out of the fifty.

On an average the region has 43 rainy days (with rainfall of 2.5 mm to 10mm or more) in a year. As in the case of the amount of rainfall, the number of rainy days decreases from the southeastern part of the region to the northwest and west.

The period from about the later half of November to the middle of February is the coolest part of the year. In December when the mean daily temperature is the lowest, the mean daily maximum temperature is 29.9° C. After the middle of February temperature begins o rise rapidly and by May, the hottest month, the mean daily maximum temperature is 40.8° C. The weather is oppressive in the summer season. With the onset of the southwest monsoon early in June temperatures begin to decline.

The highest maximum temperature recorded at Cuddapah was 46.1° C on May 18, 1906 and the lowest minimum temperature was 11.7° C on January 7 1912 and December 12, 1945.

In the summer season the relative humidity is generally 50-60 per cent in the mornings and 35-40 per cent in the afternoons. In the rest of the year it varies from 50-75 per cent.

In October and November, storms originating in the Bay of Bengal sometimes cross the East coast of India and moving in a westerly to northwesterly direction across the peninsula affect this region and its neighbourhood, causing widespread rain. Thunder storms occur in the summer and post monsoon months. The vegetation (forests) of the region is tropical dry deciduous and thorny thicket nature.

The Cuddapah region has evidenced habitations of hunter-gatherers from late Middle Pleistocene (ca. 150, 00 years B.P.) through the Holocene to the present day. The catchment areas of the river Penneru and all its major tributaries – the Chitravati, the Kunderu, the Sagileru, the Cheyyeru and the Gunjana are habitats of the Acheulian and Middle Palaeolithic hunter-gatherers – Homo erectus and Homo neandertalensis. However, Homo sapiens sapiens representing the Upper Palaeolithic and the Mesolithic were confined mostly to the eastern valley, the areas drained by the Gunjana and the Sagileru (fig. 1). There seem to be fluctuations in the habitation patterns and the population density in various periods. Based on the description and analysis of the archaeological and ethnographic data as also the previous discoveries in the region under study and the adjoining regions, attempts are made here to evaluate the Stone Age hunter-gatherer habitation patterns in time and space.

For an understanding of the Stone Age hunter-gatherers it is necessary to delineate the palaeoecology of the region during the Pleistocene.

Palaeoecology

As already stated above, no biological remains associated with Palaeolithic cultural material in the region have survived. However, on the basis of limited evidence from the Deccan (of which this region forms a part) and from Kurnool caves (in this geographical zone) a general picture of the Palaeoecology of the region can be attempted.

Faunal remains from the Late Pleistocene alluvium at Inamgaon in the Ghod Valley in Pune district of Maharashtra include *Hexaprotodon palaeindicus*, *Equus namdicus*, *Elephas* sp., and *Cervus* sp. (Kajale *et al*. 1976). Late Pleistocene fauna from the Kurnool caves is richer and consists of a variety of vertebrates (Lydekkar 1886: 120-122; Murty 1074: 222-228, 1975: 134-135, 1979: 318-319; Raju 1988: 89-90).

The mammalian species, especially the herd animals of the orders Perissodactyla and Arteodactyla, indicate a forested and grassland ecosystem with perennial sources of water. The occurrence of *Hexaprotodon palaeindicus* in the northern Deccan and Rhinoceros kurnuliensisin in the Kurnool caves in the southern Deccan during late Pleisotcene time point to the presence of perennial pools and swamps in the riverine, hilly and forested zones (Murty 1979: 318). Although *Hexaprotodon* and Rhinoceros became extinct in the Deccan, most of the other wild species especially members of Antilopinae and Cervinae surive to this day in the dry deciduous zones of the higher mountain ranges including the Velikondas. The Palaeolithic sites under discussion are situated at the foot of the Velikonda hills. The region today has dry deciduous forests with woodland, savanna woodland, shrub savanna, degraded savanna and discontinuous thorny thicket types of vegetation. In recent years, however, the vegetation cover has been much depleted due to human interference in the form of reclamation of land for agriculture, felling of trees for fuel and timber and overgrazing by live stock. Wild-life has also been destroyed indiscriminately thus disturbing the biotic equilibrium. According to old informants even 50 years ago the forests had a thicker vegetation cover and abundant wild life. Despite these factors even today the forest provide ample food resources in the form of land animals, birds, aquatic fauna and vegetal foods for the living hunter-gatherers. At least 30 species of birds, 13 species of yams, wild roots and tubers, 10 species of edible leaves, and 25 species of fruits are available in the forest. Palaeolithic settlements are located in semi-arid topographical settings offering these rich subsistence resources. This would show that the Cuddapah region was an ideal hunter-gatherer ecosystem during prehistoric times. On the basis of an examination of the distribution pattern of artefactual assemblages, the interrelationships among these occurrences, and the living hunter-gatherer-fisher way of life in the same region the following predictive models for the Stone Age hunter-gatherers can be suggested.

Lower Palaeolithic

The Lower Palaeolithic in the Cuddapah region belongs to the Acheulian. Based on techno-typological and metrical analysis in comparison with other known Indian Acheulian industries, and especially those from the northern Deccan, the Acheulian of the Cuddapah region is shown to belong to a late phase (fig. 6). The early Acheulian from the Thar desert in north-west India, and Umrethi dam site and other sites in Saurashtra have been radiometrically dated by U/Th series decay method on pedogenic carbonates and miliolite limestone respectively underlying the artefact bearing layers to above and around 200, 000 years B.P. In light of these dates, the Homo-erectus populations may be presumed to have occupied he Cuddapah region in the late Middle Pleistocene around 150, 000 B.P. But for the recent isolated discovery of the post-cranial remains of *Homo-erectus* at Hathnora in the Narmada valley, nowhere else in the sub-continent any physical remains of the arteficers associated with the lithics have been unearthed. The reconstruction of the life ways of these people are therefore based on the nature of the lithics, their distribution patterns and the locational analysis of the sites themselves.

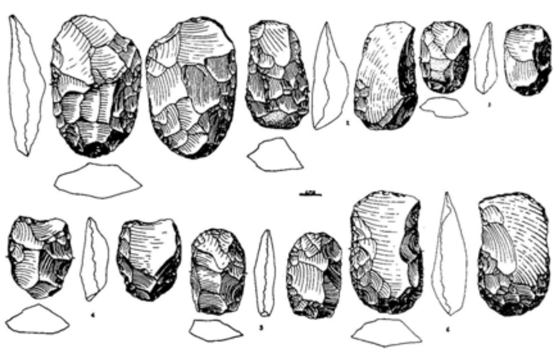


Fig. 6: Acheulian cleavers

Locational analysis of the sites in the Gunjana valley and other valleys shows that these human groups occupied places along ephermeral streams and braided runnels one to two km away from the main river channel in scrub thorny thicket hinterland ecosystem (fig. 7). Their tool kit consisted mainly of handaxes and cleavers, the latter occurring in smaller proportions (fig. 6). The raw material is coarse o medium-grained quartzite abundantly available in Cuddapah formations. The tools are bifacially worked with cylinder hammer technique, have symmetrical out lines, straight profiles and biconvex to lenticular cross sections. Handaxes have an average of 24 flake scars per tool. Majority of them are of ovate shape. Some of the handaxes with sharp cutting edges all over the periphery were probably hafted in wooden shafts like Hardwickia binata and used as spearheads and lances for hunting. The pointed handaxes were probably used for digging yams, roots and tubers. Handaxes with untrimmed butts were probably used as all purpose tools but were certainly not hafted. On the whole the predominance of handaxes in the Acheulian man's tool kit suggests his reliance mainly on a vegetal diet. Living hunter-gatherers in the Cuddapah region as also in various other parts of the world rely mainly on plant foods. While small game hunting would be regular to supplement protein, large game would have probably been obtained by opportunistic scavenging.



Fig. 7: Acheulian surface scatter at Netivaripalli

The perfect symmetry and very fine workmanship of some of the handaxes comparable to the very best anywhere else in the world and indicates apart from utilitarian functions the sense of purpose and aesthetic appreciation on the part of Acheulian hunter-gathers (figs. 6, 8).

The analysis of handaxe assemblages from the Gunjana valley clearly establishes distinct variability in different parts of the region representing different groups or similar groups with different skills or differing functional needs for exploitation of food and other resources.

Metrical analyses of the handaxes suggest that two distinct Acheulian industries occur in the Gunjana valley. Group 1 occurs at the sites of Venkatarajupalli, Netivaripalli, Siddareddipalli and Konetirajukandrika, all upstream of Chitvel, and is

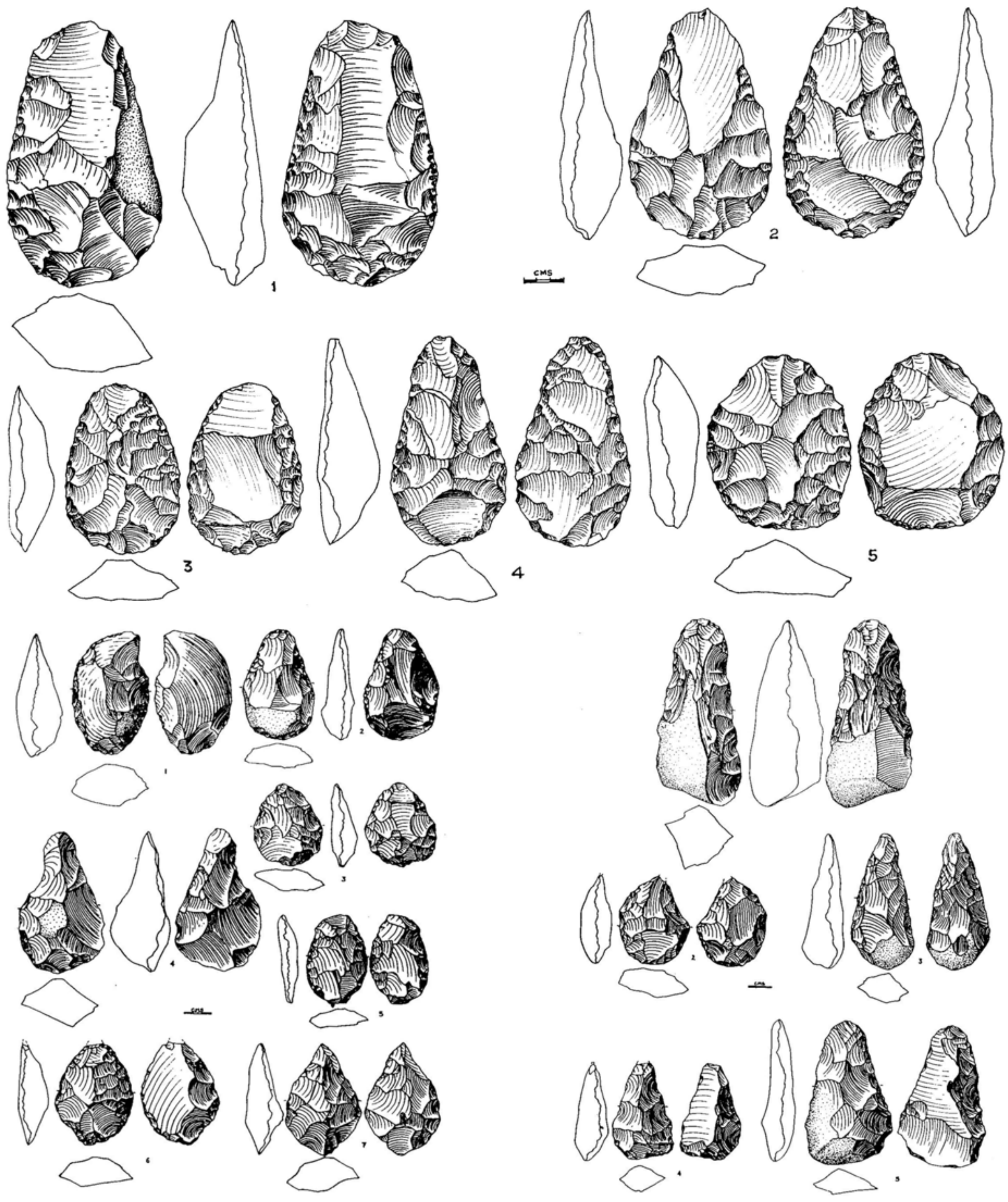


Fig. 8: Acheulian handaxes

characterized by ovate handaxes with cutting edges all around their peripheries. Group 2 occurs at Tummachetlapalli, Narayananellore, Malemapuram and Kasturivaripalli, and contains both ovates and pointed implements, many with untrimmed butts (fig. 9).

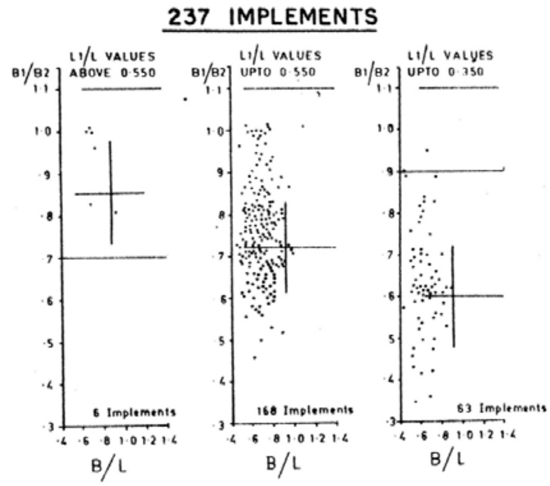


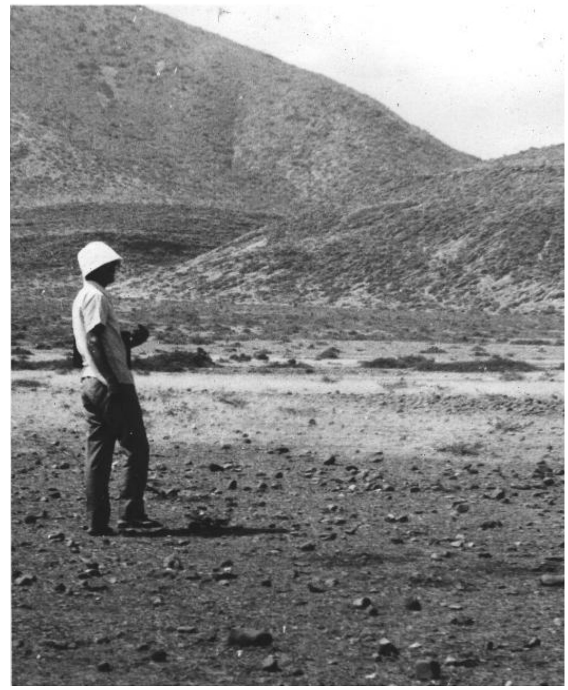
Fig. 9: Shape diagram for handaxes from Netivaripalli, Venkatarajupalli, Tummachetlapalli and Narayananellore pooled (*after* D.A. Roe 1976)

The Acheulian hunter-gatherers occupied the catchment areas of almost all the river valleys in the region – the eastern valley, the western plains as also the southern plateau. However, they seem to have preferred the valley region as shown by many sites in the Gunjana and the Sagileru valley (fig.1). The Cudaphah region is about 140 km from north to south and about 90 to 110 km from east to west. It is quite possible that small groups of people were spread over wider areas and there were inter-camp migrations. Even the adjoining areas beyond the Cuddapah region – Nellore, Kurnool, Anantapur and Chittoor have revealed evidence of Acheulian occupation.

Middle Palaeolithic

There are only two Middle Palaeolithic sites in the gunjana valley, at Tummachetlapalli and Narayananellore (fig. 10). The industry comprises points, scrapers, miniature handaxes, flakes and blades. The tools are made on a fine grained quartite and are characterized by shallow thin flake scars, step flaking, marginal secondary retouch and sharp edges (fig. 11). The general character of the industry conforms with that of the other Middle Palaeolithic industries of the south-east coastal region of India.

In view of the low artefactual yield these two sites are considered to have been transient camps. Rich Middle Palaeolithic settlements in the neighbouring Sagileru valley (about 60 km. North) and at Rallakalava in the Swarnamukhi valley in Chittoor district (about 50 km. South) perhaps served as home bases for these sites.


Fig. 10: Middle Palaeolithic occupation scatter at Narayananellore

A post-middle Palaeolithic horizon at Nandipalli in the Cuddapah region has been rediocarbon dated to 25,000 years B.P. Radiometric dates for this phase in the northern Deccan and other parts of the subcontinent range between 40, 000 years B.P. and 25, 000 years B.P.

The Middle Palaeolithic represents Homo sapiens neandertalensis, although no physical remains of the artificers associated with the artefacts have as yet been recovered. The tool kit of the Middle Paleolithic humans in Cuddapah region consists of different varieties of scrapers, points, borers and miniature handaxes or rather bifacial points. The raw material is fine grained quartzite. The occurrence of bifaces though in smaller proportion and the use of quartzite (though of fine-grained variety) as raw material indicates the persistence of Late Acheulian tradition. The miniature handaxes could have been hafted as spearheads and lanceheads. Some of the bifacial points strikingly recall Mousterian points and their thinned butts clearly indicate that they were hafted.

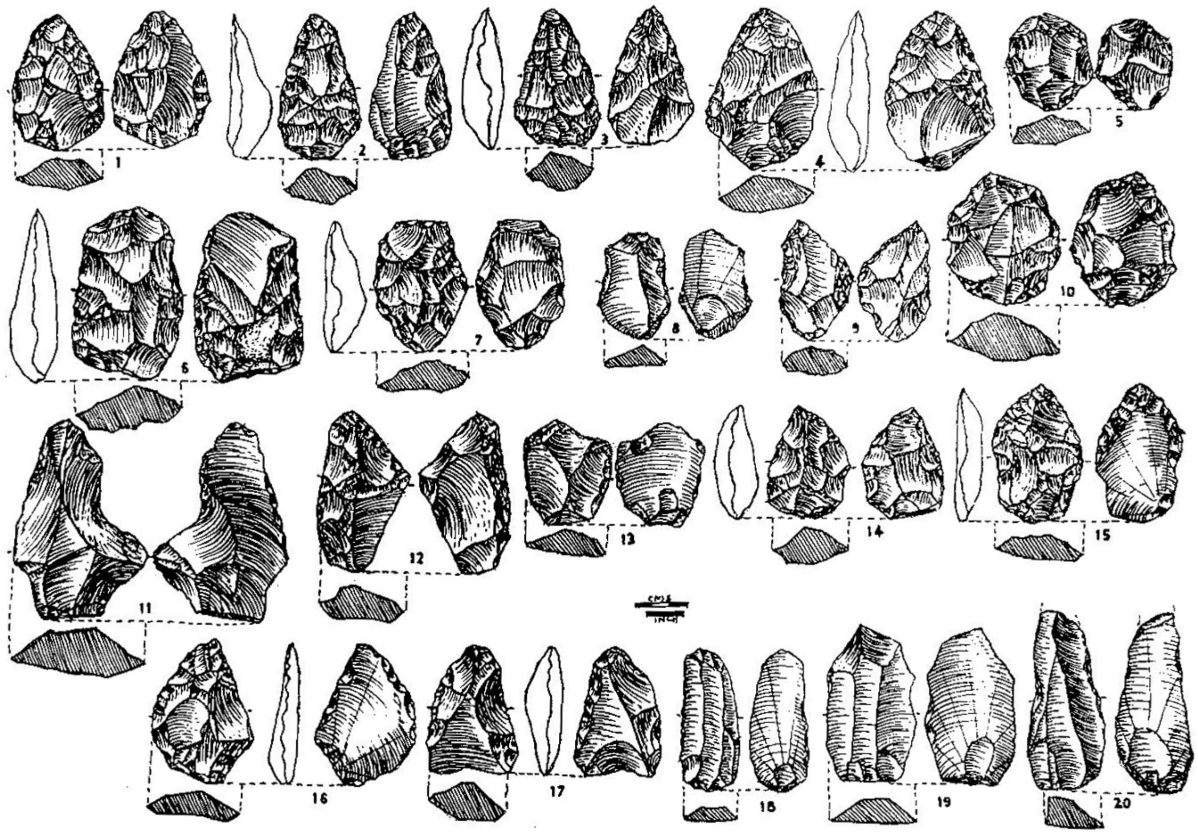


Fig. 11: Middle Palaeolithic artifacts

The large number of scrapers with edge damage, especially the concave, notched and convex ones were probably used for working on wood, bone and hide. Like the Acheulian hunter-gatherers, the Middle Palaeolithic people also occupied all the three zones. However, most sites of this phase cluster around Sagileru basin in the north-eastern part (fig. 1). It is intriguing as to why there are only two sites in the Gunjana valley. These two sites probably represent transhumance from the home bases in the Sagileru valley about 50 km north and Swarnamukhi valley about 50 km south.

As many multi culture sites indicate, the Middle Palaeolithic appears to be only a continuation of the Acheulian tradition, the difference being that the tools are smaller, lighter and better made than the Acheulian ones. Downstream of Penneru in the Nellore district are scores of Middle Palaeolithic and Acheulian sites. Hence, like the Acheulian human groups the Middle Palaeolithic hunter-gatherers were also spread in small groups over large areas. From the number and nature of sites it appears that there is no considerable increase in the population from the Acheulian times.

Upper Palaeolithic

The evidence for the Upper Palaeolithic is prolific, and comes from ten sites. The industry is based on a blade technology, and consists predominantly of backed blades and scrapers made on fine-grained quartzite and lydianite (Raju 1985; Mathpal 1985).

On the basis of radiocarbon dates from Nandipalli in the Cuddapah region, and other sites in the northern Deccan as also a TL date from the Kurnool caves, the age of this culture is ascribed to between c. 20, 000 years and 10, 000 years B.P. The authors of this cultural phase are Homo sapiens sapiens.

The very large size of the sites (up to 2 sq. km) and the high density of tools (5 to 67 per sq. m) suggests them to be home bases. Only one site namely 'Vemula' is known from elsewhere in the region and the industry here consisting mainly of

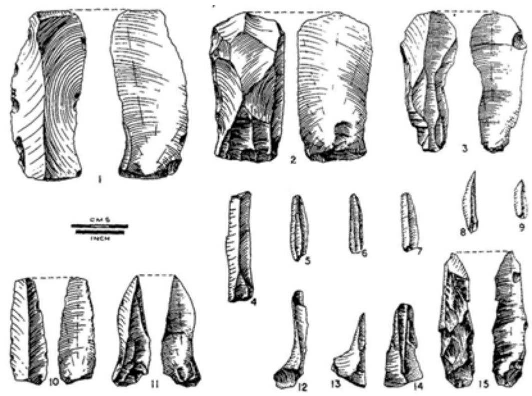


Fig. 12: Upper Palaeolithic blades

flake-blade, blades and scrapers of crude variety represents an incipient facies. The Gunjana industry, on the other hand, is much advanced comprising predominantly backed blade variants and scrapers which recall its counterparts in the blade and burin industries of Renigunta in Chittoor district (figs. 12, 13). The only difference between the two is in poor representation of burins in the Gunjana industry. The backed blade technology is very highly developed in the Gunjana industry and its products can be compared to those of the finest craftsmanship anywhere in the world. The industry considered as a whole and compared to other known blade tool based industries elsewhere in the country tends towards microlithization and would represent a late Upper palaeolithic or even Epi-Palaeolithic stage.

The various backed blade variants were probably used as composite tools such as barbed arrowheads, harpoons, slicer knives, and inserts for fish hooks. Various types of scrapers are likely to have been used for processing wood, hide and bone and for making hunting, fishing and other tools. The predominance of backed points in Upper Palaeolithic man's tool kit and their depiction in Mesolithic rock paintings as elements of arrows and spears implies that bows and arrows and spears were principal hunting weapons.

The trial excavation at Vodikalu revealed the in situ nature of the surficial artefacts found earlier at this site (fig. 14). The alluvium containing the archaeological horizon is a fine a loam which was deposited by a sluggish stream and covered the cultural materials, lying exposed on the adjacent land surface, without transporting it. The excavation yielded, along with flaked artefacts, 84 pieces of flat grinding stone slabs, 19 rubbers and 135 split pebbles, all suggesting the processing of vegetable foods at the site. This evidence is in conformity with that found in surface contexts at Renigunta. These objects provide further evidence to the fact that Mesolithic traditions in which they became more common are rooted in the Upper Palaeolithic.

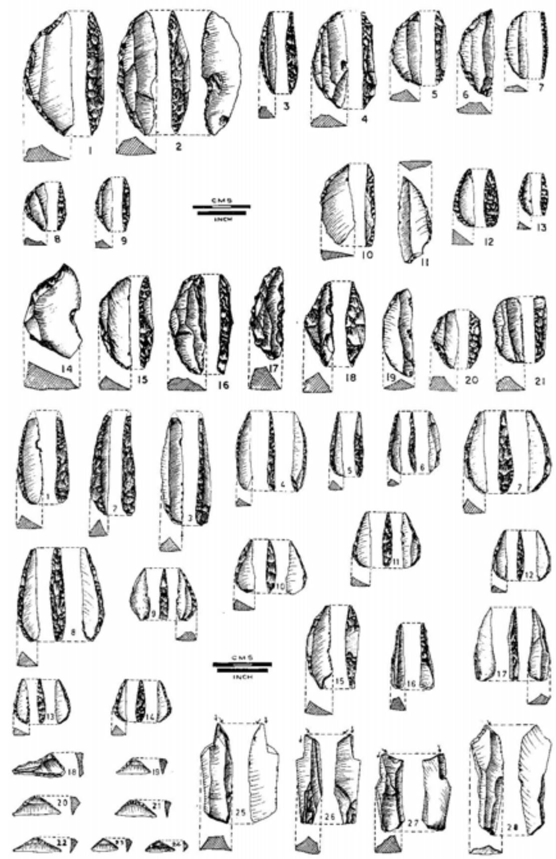


Fig. 13: Upper Palaeolithic backed blade variants

The extension of the observations derived from the analysis of the artefactual assemblages from three base camps, Vodikalu, Beellu and Rallachenu. When applied to other sites reveals that there were two home bases in the Gunjana valley: (i) Venkatareddipalli in the upstream of Kodur (fig. 2) with Mekalagunteru as the transient camp, and (ii) Vodikalu, downstream of Kodur with – Beellu, Rallachenu, Gaddalarevupalli and Nagavaram as base camps and Nagavaram – Voddipalli, Nagavaramcheruvu and Gollapalli as transient camps. These would represent two maximum bands, one at Venkatareddipalli and around and the other at Vodikalu and towards north. Their tool kits do not show any appreciable variation in typology or technology. Since the disribtuion patterns of artefactual occurrences at Renigunta and Gunjana

valley bear striking similarity, and occurrences with large quantities of artefacts spreading for several kilometres are not encountered elsewhere, it can be inferred that occupations by maximum bands of Upper Palaeolithic hunter-gatherers are unique to this geographical zone. These two occupations are separated by a distance of only 50 km that could be covered by 8 to 10 hours walk. There would, therefore, have been regular communication and exchange of ideas, innovations, and material equipment between the two camps.

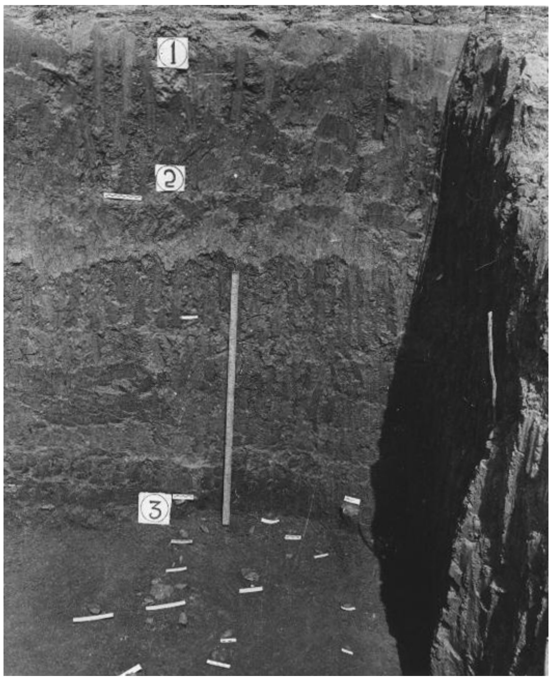


Fig. 14: Distribution of artefacts in layer 3 at Vodikalu excavation trench

The Upper Palaeolithic camps in the Gunjana valley appear to be all season camps for the following reason:

The camps are situated close to river banks and do not get inundated even during the height of monsoon when the river is in spate (fig. 15).

Raw material for tools is available as pebbles on the river bed and chunks and nodules in the nearby Velikonda hills.

Location is central with respect to food resources.

Absence of sites in the foot hills and interior of the scrub jungle. The present day Yanadis also inhabit the same topographical settings and do not change their settlements seasonally as the !Kung San who establish small widely scattered and short-lived camps during the rainy season and build larger more permanent ones during the dry season (Yellen 1978: 48). On the other hand Gould (1969) reports that the aborigines of the Western Desert of Australia congregate in large camps when standing water is most plentiful and disperse into smaller groups during drier periods of the year.


Fig. 15: A deep perennial water pool in the Gunjana Valley near Vodikalu Upper Palaeolithic site

The intra-site variability at Vodikalu, Beellu and Rallachenu indicates specific activity areas such as tool making, butchering, wood working and food processing areas.

Further, the extensive distributions of the artefacts at Vodikalu, Beellu and Rallachenu (up to 3 km. in length) and their high densities (5 to 60 per sq m) suggest that these sites may have served as home bases. They are located on alluvial flats overlooking perennial pools in the Gunjana river (fig. 15). This relationship strongly suggests the exploitation of aquatic resources. Moreover, the locations of these sites are such that they never become inundated, even when the Gunjana is at the peak of its monsoonal spate. Also, the absence of base camps in the foothills or interior forests may suggest that these alluvial sites were all-season camps with prolonged occupations.

At Vodikalu the artefactual assemblages are distributed in clusters, each cluster separated from the other by 5-10 m In respect of spacing, these clusters recall the present day Yanadi occupation patterns. If we assume each cluster of artefacts to be the handiwork of a nuclear family, a unit of a

minimum band, then there would have been a dwelling hut associated with each cluster. The Yanadis manufacture and maintain implements and perform most of their activities including processing of food outside the hut, usually under the shade of trees. These clusters then are he work areas outside the huts. The Upper Palaeolithic bands could also have taken shelter under the trees which is a practice of the Yanadis of the area (fig. 17).



Fig. 16: Upper Palaeolithic surface scatter near the excavated trench at Vodikalu

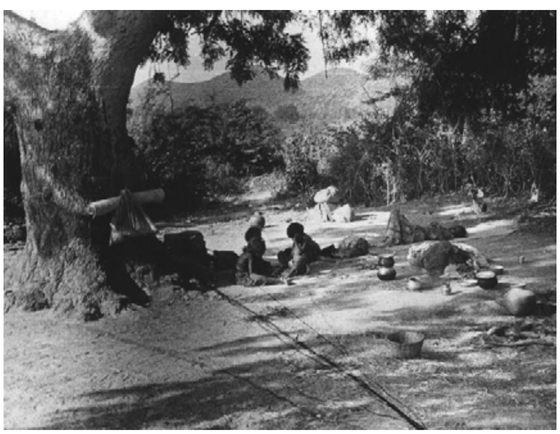


Fig. 17: A temporary encampment of Dasari, a nomadic tribe under the shade of a tree

There are several instances in the Yanadi life style which can be taken to suggest the plausible modes of activities of the terminal late Pleistocene hunter-gatherers. Some of them are: use of bottle gourds for storage of water during hunting expeditions, use of various nets, traps and other hunting aids for hunting, fowling and bird catching, extraction of honey, collection of minor forest produce, foraging fruits, roots, tubers and green leaves, the use of digging sticks, hunting birds by pelting stones, catching fish with bare hands by diving into muddy waters and hitting fish with stones (figs. 18, 22, 23, 28). Various scrapers and backed blades in the Upper Palaeolithic mans tool kit were probably used to make prototypes of nets and traps. While it is hazardous to correlate the yanadi life ways with the terminal Pleistocene hunter-gatherers, it does demonstrate the resources potential of the region and its carrying capacity to support considerable hunter-gatherer populations. The Cuddapah region consists of a tectonically stable land mass and here is no evidence to show any appreciable change in the ecology or physical environment from the terminal Pleistocene through the present. If anything, the biomass has been depleted to a considerable extent during the last century due to the spread of modern civilisation. The Yanadi huts are so simple and flimsy that the Stone Age hunter-gatherers would have easily built such simple dwellings.

Taking clues from the food habits of the Yanadis, it is reasonable to predict that the upper Palaeolithic hunter-gatherers relied on aquatic food resources for their subsistence as much as on game and wild vegetal foods. All the Upper Palaeolithic sties are located close to perennial water sources (fig. 15). Further, consumption of roots and tubers must have been an important part of the Upper Palaeolithic diet as the Yanadis are known to have lived during seven years (1950-57) of continuous drought mainly on wild yams like *Dioscorea oppositifolia*, *Dioscorea bulbifera*, *Dioscrorea pentaphylla* and *Dioscorea sylvatica* supplemented to some extent by roots, honey, fish and game. Such habits and practices possibly have a high antiquity and indicate the traditional subsistence patterns among the late Pleistocene hunter-gatherers.



Fig. 18: Yanadi set out for fishing with *Dindu* a float and nets

An attempt at the estimation of population at Vodikalu and neighbouring camps based on approximate floor area and settlement patterns of documented extant ethnographic populations would indicate that Vodikalu supported 190 people divided into six minimum bands each comprising 5 to 6 nuclear families of 5 members each. Beellu would have supported two minimum bands consisting of six nuclear families (a total of 60 people) and Rallachenu would have supported 30 people – one minimum band with 6 nuclear families. These figures, however, are by their very nature highly speculative. Yet they serve to give a rough idea of increase in population with the passage of time.

Vodikalu is the largest of the three camps. The distance between any two of the camps is less than 2 km There would, therefore, have been continuous communication, social interaction and exchange of material items s well as people among them.

From the locational point of view, it is intriguing as to why the terminal Pleistocene hunter-gatherer sites are confined only to the south-eastern part of the region namely Gunjana Valley. We may need to look at a broader regional perspective to understand this. During recent explorations, I have discovered at least 14 very rich Upper Palaeolithic occurrences with artefact spreads extending to a few hectares in the Kalletivagu valley in a thick forested environment in the Cuddapah-Nellore border area. Further at least 84 Palaeolithic sites some of which are possibly Upper Palaeolithic were reported in the catchment areas downstream of the river Penneru across the Velikondas and close to the coast of the Bay of Bengal. Also the rich Upper Palaeolithic sites in the Swarnamukhi valley are about 50-60 km south of the Gunjana sites. This presents an interesting picture. Although Upper Palaeolithic sites are reported from many parts of India during the last three decades, to my knowledge the sites reported in this study and those of Renigunta appear to be some of the richest in the subcontinent and are very important for understanding the transition of hunting-gathering to agricultural and agro-pastoral economies. But unfortunately not a single habitation site has been subjected to large scale horizontal excavation in the entire southern Deccan, the result of which is that no faunal remains are forthcoming for reconstruction of their economy.

Mesolithic
No sites of the Mid-Holocene microlithic industries have been encountered in the Gunjana valley. However, K.T. Reddy had reported four sites in the Sagileru basin. This again poses a problem. The question remains as to what happened to the late Pleistocene and early Holocene human groups. Swarnamukhi valley in the south and Kurnool and Anantapur regions in the north and west of this study region have evidenced Mesolithic sites. Several sites also have been reported recently in the Visakhapatnam coast by the Department of Anthropology, Andhra University.

To sum up, the present study has raised some interesting questions which with the present state of our knowledge cannot be answered. These are:

Is the Acheulian in south-east India indigenous? If so why only late Acheulian? What happened to the early Acheulian?

Had the Acheulian populations migrated from the northern Deccan where are such sites reported?

What happened to the Mesolithic in the Cuddapah region?
In the northern Deccan, central and north-west India, sites representing the Mid and Late Holocene industries are innumerable compared to those of the terminal Pleistocene indicating almost sudden population growth. The southern Deccan on the other hand presents a contrasting picture. Why?

Ethnographic evidence
Ethnographic data on Yandis, a simple society living in the same region has been collected to elicit information on their settlement patterns and subsistence strategies to gain insights into the past. A summary of the same is given below:

A study of the way of life of the Yanadi fisher and hunter-gatherer people who inhabit the Gunjana valley today, very often living on the same sites as were occupied by Upper Palaeolithic people, was undertaken with a view to gain an insight into the subsistence and settlement patterns of the Upper Palaeolithic. The Yanadis were until recently pure hunter-gatherers, but now many groups have settled near farming villages where they work as manual labourers or watchmen in the fields of agriculturalists. Traditionally, they lived in bands of 3 to 20 families in rather haphazard settlements of circular huts with conical roofs, made entirely of

plant materials. Such huts are still built and are generally 3 to 4 m. in diameter with walls 0.5 to 1.5 m in height. Entrances are very small (0.95 to 1.10 m high; 0.70 to 0.95 m. wide) and are closed by doors of leaves and twigs (figs. 19, 20).

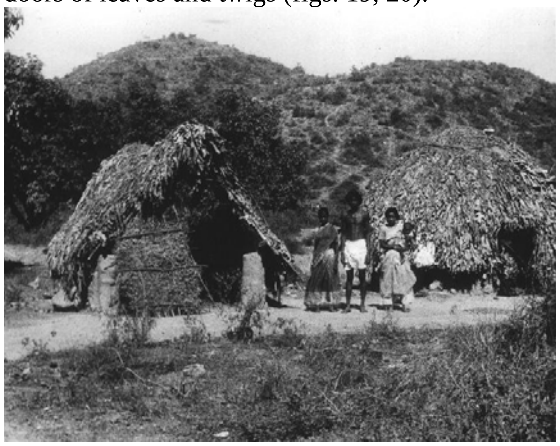


Fig. 19: Yanadi settlement at Rallachenu showing circular and oblong huts

The Yanadis have an expert knowledge of their environment. They are intimately familiar with all animals, birds, fish and useful plants in their habitat, and these play important roles in subsistence. Yanadi hunting expeditions consists of 3 to 10 persons, who traverse the forest for up to 20 km and stay away form their settlements for 3 to 4 days, or even up to 10 days if game is scarce. They erect small temporary huts for shelter in the forest or use caves and rock-shelters when available. After a kill is made, a portion of it is cooked and eaten on the spot, and the rest is sun-dried on rocks and taken back home for later use, together with bones, horns and antlers required for other purposes. Quartz and quartzite flakes are often used for butchering.

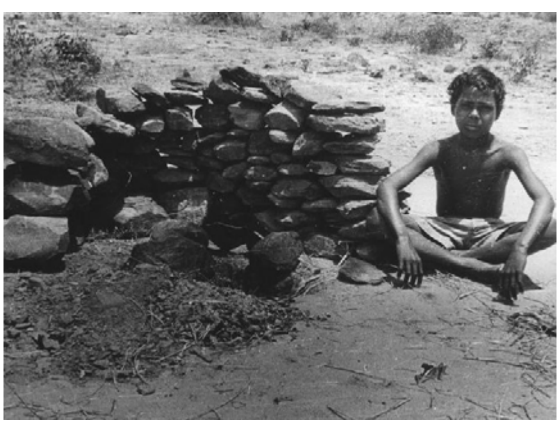


Fig. 20: A hearth outside Yanadi hut protected by a semicircular alignment of stones as wind break

The Yanadis hunt at least 14 species of terrestrial game with snares, nets and other methods. The prey includes hares, lizards, squirrels, porcupines, wildcats, rats, bandicoots and langur monkeys (fig. 21). They also catch at least 45 species of fresh water fish by as many as 12 different methods, using fish-traps, weirs, nets, hooks and poisons (figs. 23, 24, 25, 28).



Fig. 21: Two Yanadi boys catching field rats in the open scrub near Beellu, Upper Palaeolithic site

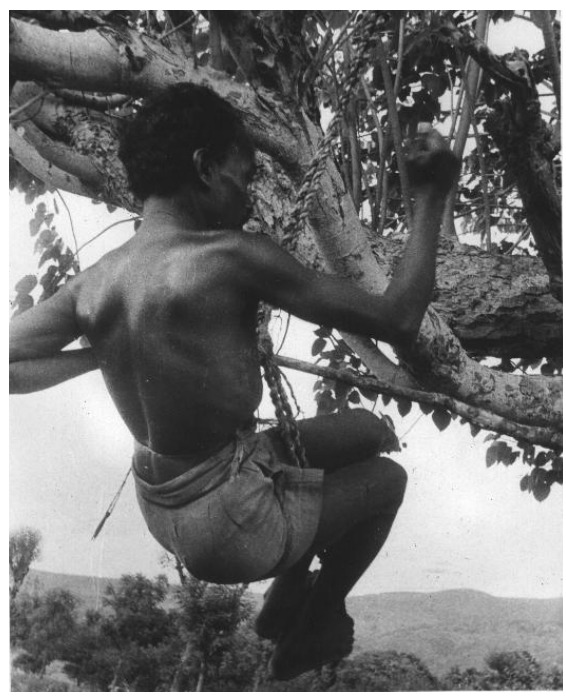


Fig. 22: Yanadi demonstrating the process of honey collection

In addition, they can identify 68 species of birds, of which 6 are regularly caught in nets, snares and cages (figs. 26, 27). They consume at least 13 species of yams, wild roots and tubers, 10 leafy

greens, and 25 species of edible fruits (fig. 29). They collect 22 other items of minor forest produce, and after using some of these for subsistence they exchange the rest with farmers for grain or cash.



Fig. 23: A Yanadi boy shooting fish with bow and arrow



Fig. 24: Yanadi woman collecting the mid veins of coconut leaves for a fish trap



Fig. 25: Yanadi fishing by a method known as *Dindeta*

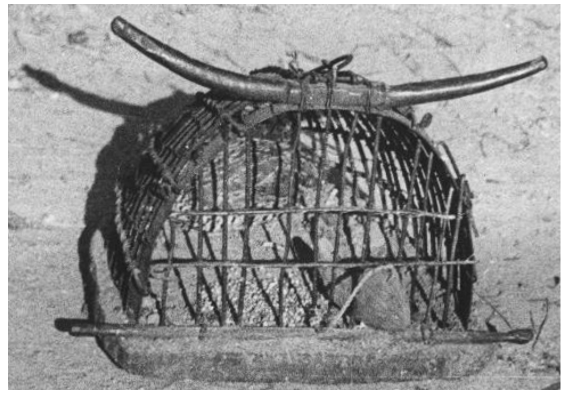


Fig. 26: Cage for bird catching

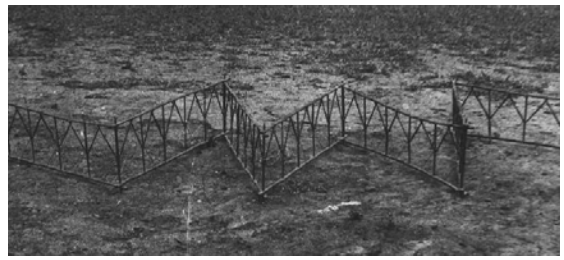


Fig. 27: *Padi*, a multiple noose bird catching trap laid in the open scrub for patridges

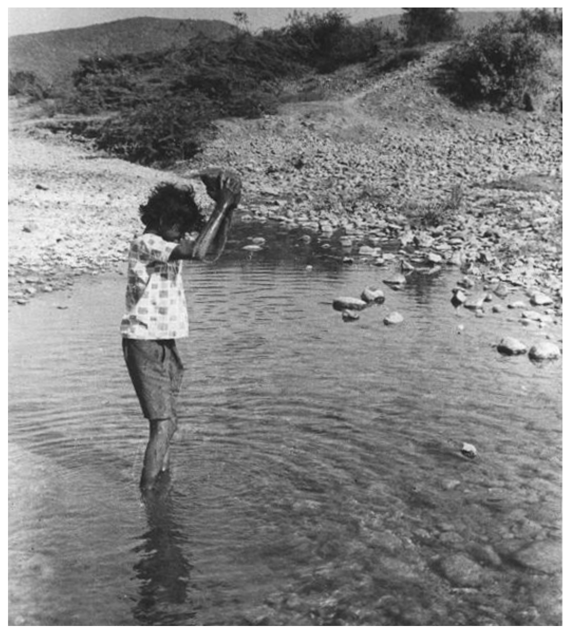


Fig. 28: Yanadi boy hitting fish with a pebble

It is interesting to note that the various local names for species in the flora and fauna, and many of their food and medicinal uses, are known only to the Yanadis and not to any other fully agricultural communities in the region. Their intimate knowledge suggests a long tradition of extensive exploitation of flora and fauna. The physical

correspondences between the locations of Upper Palaeolithic sites and Yanadi settlements are too close to be purely coincidental. Indeed, it seems very likely that Yanadis are the cultural and biological descendants of the Stone Age hunter-gatherers of the region (fig. 30), who probably lived a lifestyle not very different in terms of the nature of their settlements and subsistence patterns.



Fig. 29: Yanadi children out in the open scrub gathering the young shoots of *Carissa spinarum*



Fig. 30: Yanadi hunters on the move for prey

Prospects

To date, very few Palaeolithic sites have been excavated in the region that too on a small scale and most of the studies from surface scatters and stratified contexts are devoted to techno-typological aspects and time-space systematics (Murty 2002). To know more about the life ways, and reconstruction of culture process, it is necessary to excavate primary sites on a large scale to recover human skeletal remains associated with lithics and faunal and other biological remains. To understand better it is necessary to uncover and study the pattern of distribution of artefacts, ecofacts and other features over activity areas. The surface itself needs to be excavated over wide areas so that all these can be plotted to see the relationship between different kinds of tools, debitage and bones. The sites need to be looked at not in isolation but in relation to one another. At a given time period it must be possible to connect sites together to show the pattern of resource use in the prehistoric past. Although artefacts are important as makers of the loci of activities of early humans, information on the spatial configurations of artefacts is just as important as the technical data on the morphology of the objects themselves (Settar and Settar 2000).

During the last twenty five years, there have been significant changes in method and theory in archaeology. Multi and inter-disciplinary studies involving geomorphology, taphonomy, site formation processes, site catchment analysis, bio-archaeology and palaeodemography are being carried out (Hodder 1995; S. Pappu 1996; Raju 1988; Settar and Settar 2002; Jones 2002; Paddayya 2002, 2002a).

Further research incorporating latest methods and theory, and multi-disciplinary approach with systematic excavation of primary sites and study of surface scatters should throw considerable light on the life ways of the early hunter-gatherers. This is urgently called for as stone Age sites are being increasingly disturbed and destroyed under the impact of agricultural activities encroaching even into marginal areas, irrigation and hydro-electric projects, construction of roads and rail tracks and intensified industrial activities.

Acknowledgements

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Microlithic sites in Tarafeni valley, Midnapur district, West Bengal: A view in hindsight

Bishnupriya Basak

Microlithic sites in the Tarafeni valley, a region in north-west Midnapur with an area of 450 sq. km, had formed the subject matter of my Ph.D. research (1992-97). After a gap of nearly eight years rethinking about the topic leads to a reappraisal. Here I am giving a summary of my thesis, followed by a brief discussion of how I would have liked to see it now in terms of recent research. To elaborate the latter I am including a summary of my current project, which is in progress.

Microlithic sites in the Tarafeni Valley: A summary

Prehistoric research in West Bengal was mainly concentrated in the western upland covering an area of 3000 sq km of Purulia and the western parts of Bankura, Birbhum, Burdwan and Midnapur. Scholars working in this field had undertaken only sporadic surveys to locate stone tools and build a general stratigraphy for the region. This fell short of a holistic and systematic study of the archaeological record of a natural unit. Keeping this lacuna in mind the Tarafeni valley (covering an area of 450 sq km) in northwest Midnapore district was chosen as an area of research. Forty-nine microlithic sites were located of which twenty-four were discovered by previous scholars. Instead of taking up isolated sites for investigation the distribution of both sites and scatters across the landscape was taken into account. Sites, here were defined as discrete clusters of artefacts occupying nodal points in the landscape, as distinguished from occurrences of isolated artefact(s) or diffuse scatters (‘off-site’ or ‘non-site’) continuing between sites and distributed through out the landscape. A multidisciplinary approach was adopted to study the context of the sites that revealed new information on the late Quaternary palaeoenvironment and a chronology of Terminal Pleistocene was proposed for the sites.

Studies in prehistory in India and particularly in Bengal usually look at stone tools as diagnostic forms of particular cultures and are thus reduced to a stereotyped cataloguing of “finished tools” followed by a technical analysis of the techniques of production. On the other hand, here, the entire assemblage was taken as the unit of analysis to see how the broad stages of reduction were reflected therein. The aim was to look at the processes of raw material procurement, manufacture, use, maintenance and discard of tools from the assemblage. These processes throw light on the past strategies and plans of land use adopted to cope with the environment in a particular context. This is known in archaeological literature as the study of “organization of technology” and is different from the study of a set of objects or “tools”, an industry or a particular production technique that are the products of this adaptation. The methodology adopted here was built on similar studies of lithics carried out in other parts of the world. Ethnoarchaeological and ethnographic case studies of modern day hunter-gatherers were used as conceptual tools to gain an insight into past human behaviour.

Major sources of raw material used in the manufacture of the microliths were absent in the region. Initial stages of trimming were also absent in the assemblages as seen from the nominal presence of cortical flakes and the negligible number of raw material blocks. The number of raw material blocks was very low as compared to the number of cores present. Thus it was surmised that on-place reduction of blade cores from nodules is non-existent in the region. Possibly partially made cores were brought here and the cortical flakes that were present formed bi-products of the post-initial trimming phase. Such evidences are prevalent in archaeological and ethnographic case studies. Subsequently, I tried to see how the post-initial trimming phase was reflected at the various sites, whether there was any difference in the way that different parts of the landscape were used in the past. Certain stretches of the landscape showed a greater concentration of sites. A differential discard of different artefact groups was also seen at different places. These parameters pointed to a differential place use. No definite answers were given as to why the region was important to prehistoric populations, only plausible reasons were suggested. Ultimately what emerged from this work was the diversity and complexity of human behavior and the myriad problems of defining them in material culture.

New Vistas

In the past one decade or so landscape as a culturally constructed phenomenon has emerged as

a distinctly important area in archaeological research, many of these ideas having been borrowed from social and cultural anthropology and cultural geography. Henceforth discussions on landscape crystallized into two polarized views: a previously-existing ecological one, which subsumed landscape under the broad rubric of environment to which human beings adapt; and a cultural one, which views landscape as 'meaningfully' constructed. Landscape became one of the important items of the processual/post-processual debate. A necessary component of the processual approach is a regional orientation to the archaeological record. A region is defined as a natural geographical unit with reference to one or more natural features. The relationship between people and landscape is seen as one of functional dependence along 'adaptive parameters' where issues like range of environmental resources exploited, resource-acquiring technologies, degree of mobility, seasonality and scheduling in relation to settlement size assumed supreme importance (Tilley 1994). Incidentally this is the approach that I had adopted while looking at past human behavior in Tarafeni valley.

I am working within the perspective that landscape is a culturally constructed phenomenon (Ashmore and Knapp 1999). Through phenomenological approaches used by cultural and social anthropologists landscape has emerged as constituted by human dwelling, shaped by human choice and preferences**.** It follows from this that it is not universal and objective (Thomas 1993; Ashmore and Knapp 1999: 14; Bender 1993). There are various readings of landscape, the result of different social and cultural contexts. Recent researches in ethnography and cultural anthropology have led to an 'unpacking' of the western idiom and encouraged one to look beyond an European construct. Archaeologists, while deviating from the traditional concept of 'site' have started focusing more on natural places of significance in the landscape which yield residues of archaeological culture, in doing so, they have drawn heavily on these studies.

A shift from this ecologically deterministic approach is seen among scholars like Tilley (1994), Bender (1993), Thomas (1993) and Bradley (2000). (There is voluminous literature on this, for initial readings see Ashmore and Knapp 1999; Bender 1993). Tilley (1994) argues that the landscape is suffused with myths, cosmologies and symbolisms which give an insight into how and what people think/perceive of the environment. The same relief and drainage assume a different significance. Choice of particular locations for habitation or erection of monuments acquires a cultural meaning, as distinct from simple ecological connotation. This is not to dispute or disregard the importance of the latter. People do not occupy inhospitable locales only on the basis of a set of meanings and symbolisms. But with the passage of time the locales chosen for their habitational utility become associated with these meanings and symbolisms, which become too important to be ignored. As case studies Tilley selected one coastal and two inland regions in Wales and Dorset, distinctively different in relief from each other, which show a substantial presence of Mesolithic flint scatters and Neolithic monuments. Tilley argues that during the Mesolithic, in all three areas, ancestral connections between people and landscape were manifest in paths of movement and certain places along these paths assumed a particular significance to which they returned regularly in their seasonal activity rounds. However, these Mesolithic populations made very little impact on the land and what survives are some flint scatters. In the Neolithic the monuments restructured the relationship between people and landscape as it became more 'anchored'. Although differences existed among the three regions, the cultural memory of a 'place' and the connections between such many places were stabilized by the construction of monuments at these significant points. In a word, the landscape was 'appropriated'. Tilley relates this to subsistence practices and shows how these change from simple seasonal movements of animals in the Mesolithic to a more meaningful domestication in the Neolithic.

Such studies try to break landscape free from a dry environmental approach. However, for a holistic understanding of landscape an interdisciplinary approach is required, involving palaeo-ecology, environmental science, history, human geography, cultural anthropology and archaeology. Peoples' perceptions of land are extremely important, it is equally important to understand the palaeo-landscape, whether one is dealing with one landscape or more; the context of sites, whether they can be related to the same chronological period. This is all the more true for lithic scatters, a Neolithic or Megalithic monument on the other hand is more easily identifiable with a particular time frame.

In my ongoing project I am dealing with microlithic scatters, sites in the region around Ayodhya hills, Purulia West Bengal. A discussion of this project will show how and to what extent it differs from my Ph.D dissertation. Maybe this is how I would like to see Tarafeni valley now.

Lithic scatters and perceptions of landscape: Ayodhya hills, Purulia, West Bengal

Using microlithic scatters in Ayodhya hills as a case study I am trying to see how far perceptions of landscape can be seen from the locations of these scatters and a study of their assemblage. A rich, vibrant body of rituals, ceremonies, myths and symbolism surrounding the hills and other natural features in the landscape exists among the local indigenous communities. Using this as a tool to work with I am also trying to see how far ethnography can be used to offer insights into past perceptions. I am working within the perspective that landscape is a culturally constructed phenomenon; here I am relying on recent archaeological, anthropological and culture-geographical approaches to landscape.

In Indian prehistory landscape has emerged in two ways—as a geographical region, providing the backdrop to a reconstruction of past life ways and as 'environment' where existing features are used to reconstruct the palaeo-environment. Landscape as a culturally constructed phenomenon has remained outside the boundary of these studies. Unlike monuments, which have a more solid, anchored position in the landscape, lithic scatters are less 'impressionable'; therefore decoding their meanings and symbolism is more challenging and perhaps more difficult. I am showing that, despite limitations, stones do speak out to us. This has also been a personal journey through the landscape of Ayodhya hills, where sifting out a particular level of perception has been a complex task sometimes.

The microlithic scatters are approximately dated to the Terminal Pleistocene through an analysis of the context and stratigraphy, and comparing them with those of Tarafeni valley where the sites could be relatively dated to the Terminal Pleistocene. These are chiefly concentrated around prominent hills and rocky outcrops, which emerge as 'significant natural markers' in the landscape. A detailed study of the assemblage shows that major zones of activity were around these natural markers. Over time these markers have gathered stories, legends and mythological associations as reflected in some of the local ceremonies and festivals centering on them. A few scatters situated away from these major zones were ephemerally utilized, this is not to suggest that they were less significant places, the more 'fragile elements' in archaeological record are often lost to us.

My ethnographic study is not suggesting any unbroken continuity of worship of these hills and natural features; it is only offering me with an alternative vision of landscape. By seeing these scatters as 'significant places' in the landscape I am suggesting that a lot lies beneath and beyond a mere concentration of artifacts.

This is a shift from a functionalist approach where the emphasis is only on understanding past strategies of use and reuse of landscape from lithic scatters. Although the methodology of stone tools analysis adopted in the earlier work has been maintained in the current project the emphasis has been more on understanding past perceptions through lithic scatters and their location.

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A Re-examination of the Upper Palaeolithic 'Damin Industries', Bansloi River Basin, Jharkhand

Kumar Akhilesh

Introduction

This paper focuses on a description of cores from the Upper Palaeolithic 'Damin' industries of the Bansloi river basin, Jharkhand. This work forms part of a broader study which aims at the re-examination of these industries in the wider context of the Indian Upper Palaeolithic. Specific goals of this study include examining the stratigraphic context of sites and the context of artefacts; the nature of assemblages, inter-site variability and lithic technology; in order to put forward some models of prehistoric landuse patterns in the region.

The discovery of a possible Upper Palaeolithic in Bihar can be traced back to the work of Anderson (1917). Subsequent studies (Narayan 1996; Chakrabarti 1993), led to the establishment of varied flake and blade and blade based industries over parts of modern Bihar and Jharkhand. The 'Damin' industries were first studied and categorised as such by D.K. Chakrabarti (1993) as part of his broader survey of the prehistoric archaeology of eastern India. The region where these industries occur comprises part of the Santal Parganas (currently parts of Dumka, Pakur, Godda and Sahebganj districts of Jharkhand). This region was referred to as Damin-i-koh or "the skirts of the hills" by British administrators in the 19th century; hence Chakrabarti classified the industries which fell within this region as the Damin industries (Chakrabarti 1993). He described the Damin industry as an "..Upper Palaeolithic industry with microlithic elements, which occurs in a well defined stratigraphic situation and is marked by the almost exclusive use of a patinated brownish cherty material as raw material" (Chakrabarti 1993:102). In this industry, retouched flakes, cores and scrapers constitute more than 70% of the tool collection. Scrapers are predominant. Blades are fewer in number as compared to other types. Of the 36 sites discovered by Chakrabarti, microliths are noted along with Upper Palaeolithic tools at 15 sites. He suggested that the Damin industry was an incipient blade industry with an element of burins (Chakrabarti 1993:102). He attributed it to the Upper Palaeolithic based on the presence of tools in stratified contexts, and the occurrence of an incipient blade industry with burins. He noted that although scrapers suggested a Middle Palaeolithic affiliation the presence of microliths called for an Upper Palaeolithic status (Chakrabarti 1993: 108). His work, although limited to a brief survey yielded new information and established the overall presence and nature of industries in the region. Narayan (1996) in his summary of the Upper Palaeolithic of Bihar and Jharkhand, believed that this industry differed from the early Upper Palaeolithic industries of Singhbum, as also from the developed Upper Palaeolithic industries with backed blades, Chatelperron and Gravettian knives, points, bladelets, etc.; from Palamau, and the amorphous nature of industries from Hazaribagh and Giridh. He noted a striking contrast between the thick broad blades struck from crude prismatic cores in Singhbum and the parallel sided blades and standardized prismatic cores of the Damin region (Narayan 1996: 264). The limited nature of the studies conducted, intriguing descriptions of the nature of the blade industry described required further re-examination of it's position within the Indian Upper Palaeolithic, and constituted the subject of research in the author's doctoral dissertation.

The Region

The study region (Fig. 1) comprises an area of 195.6 km^2 (24°30' to 24°45' N and 87°34' to 87°45' E), and lies in a part of the 'Damin' area, falling in the basin of the river Bansloi. It is bounded by the Rajmahal hills in the west; which rise to a maximum elevation of 423 m at Tongi Pahar (24°38' N: 87°34'E). Outliers of the Rajmahal hills are noted towards the east, which range in elevation from 105 m (Charka pahar, 24°42' N: 87°32' E) to 185.4 m (Dhamsi pahar, 24°44' N: 87°40' E). The region is drained by the river Kirla which drains into the river Torai and eventually into the Ganga. To the south of the region lies the river Bansloi. Numerous first and second order streams are noted. These originate in the Rajmahal hills and their outliers. Several natural water tanks are also noticed near Kariodih, Karanghati, Ranga, Jhenagaria, Taljhari, and Litipara.

An intensive field survey of the area was conducted (2001-2004), with the aim of sampling different geographic/ geomorphic zones. Within each broader locality, sites (area with high density of

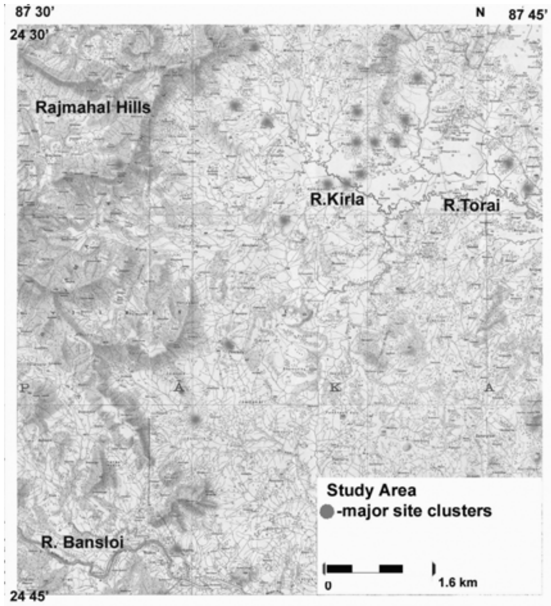


Fig. 1: The region showing distribution of major sites.

tools) were mapped. Low-density artefact scatters were noticed occurring between sites. Although in general artefacts were collected randomly, grids of 1 x 1 or 2.5 x 2.5 m were laid out at selected areas from which all artefacts and natural clasts were collected. Further, a collection of all artefacts, natural clasts along with the top 5 cm of sediment cover was made from 1x1 grids at selected sites for a purpose of studying natural formation processes, and to obtain a controlled sample from these sites. In addition to this, sections studied were mapped, drawn and sediment and clast samples were collected for further analysis. A sample of chert types from all chert sources studied and from each site was also collected with the aim of conducted raw material provenance studies.

A total of 20 sites and off sites were studied. The oldest land surface comprises the Rajmahal Trap. These were capped by Tertiary laterities at elevations ranging from 54-102 m AMSL, weathering of which led to the distribution of lateritic nodules, granules and ironstones within the Pleistocene drainage system. Possible Lower Palaeolithic artefacts were noted in a bouldery-pebbly cemented conglomerate seen at Karanghati along the river Torai. Upper Palaeolithic tools occur in varied contexts:- a) on the surface of weathered Rajmahal Traps and Tertiary laterites; b) eroding out of lateritic regoliths and on their surface; c) within cobbly-pebbly high-level gravels; d) in calcretised silts. Studies are in progress as to the nature of Pleistocene geomorphic processes as also on site formation processes in the region.

The Lithic Assemblage

A total of 1430 artefacts were studied from a total of 20 sites and off-sites. Of this 110 comprised cores of various types. Parameters chosen included raw material types, state, patination, abrasion, core type, dimensions, the nature, number and dimensions of blanks detached, nature and position of striking platforms, percentage and position of cortex (Deraniyagala 1993; Ghosh 1993; Inizan *et al.* 1999, Inizan and Lechevallier 1995; Misra 1978; Murty 1979; Paddayya 1970; Raju 1988; Sali 1989; Sharma and Clark 1983). In addition to this, a detailed study of blades and flakes, and core trimming elements in the assemblage is under investigation and preliminary results of this are presented here. A study of the raw material nodules noted at each site was also conducted.

Cores

A total of 110 cores were studied including blade cores (n=64), flake cores (n=21) and intensively reduced cores (n=25) (see Table 1). Raw material comprises fine-grained siliceous material of which varied categories of chert predominates. The following types of cores were noted.

Blade Cores

A total of 64 blade cores were noted with mean dimensions of 40.29 x 31.52 x 22.73 mm (Sdev-L=12.89; Sdev-B=10.19). While most blade cores are on chert; one example each was noted on basalt, agate, chalcedony and quartz. Modified nodules which may represent blade core performs are noted in four cases and measure 66.34 x 37.24 x 28.97 mm. In one case, an attempt has been made to create a ridge; in the second example preliminary blade like flakes were detached following which the core was abandoned. One tool has evidence of preparation of a crested ridge on two edges of an elongated chert nodule. No blades were detached, but the tool appears to have been utilized (Fig. 2).

Opposed platform blade cores (n=10): These are all on heavily reduced nodules and have mean dimensions of 37.87 x 31.69 x 23.06 mm. Five have <25 % cortex occurring along one face. The last generation of blade detachment comprises around two-three blades per core. Average blade scar dimensions are 32.55 x 10.79 mm, with a tendency towards smaller narrower blades. Core

shapes range from roughly pyramidal to irregular and heavily reduced cores. A variant of this type includes a core on an older flake. Three blades were detached from opposed platforms. Blade scars here are unpatinated, as contrasted with the patinated surface of the older flake.

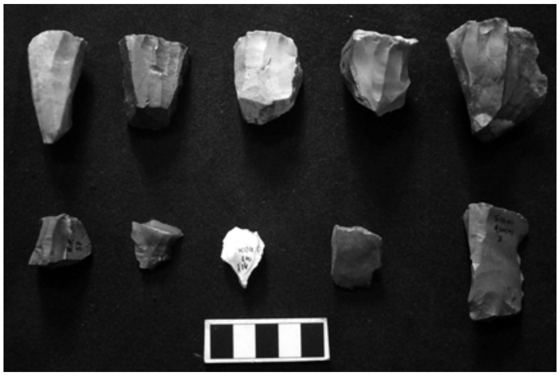


Fig. 2: Blade cores (note row 2 with microlithic cores, and presence of two artifacts on cores: numbers three and five from left).

Multiple platform cores (n=8): In these cores (mean dimensions of 37.87 x 31.69x 23.06 mm), two striking platforms are noted perpendicular to each other. The final blade scars visible, average two to three per core with mean dimensions of 24.45 x 10.64 mm. Cores are intensively reduced, noncortical and characterized by extensive trimming.

Single platform cores (n=25)**:** These constitute the bulk of the sample. These comprise the following types:

a. ***Standardised pyramidal to rectangular core*****:** (n=9): These have mean dimensions of 52.36 x 39.12 x 29.00 mm and range in shape from typical fluted cores to those which are roughly pyramidal and rectangular in shape. The final generation of blade scars is noted covering only one face of the core, with the opposite side being either cortical or partly cortical (n=2), comprising the split partly cortical face of the nodule (n=1), a split face partly flaked (n=2), or intensively flaked (n=2). In one case blades were detached from all around the circumferance. In most cases only two-three blades were detached. However in three cores, systematic detachment of standardized blades was conducted with a maximum of four-five blade scars being noted. In one core the preparation of a crested ridge is clearly visible. Blade scar dimensions vary greatly and range from 59.44 x 18.18 mm to a minimum of 43.35 x 5.39 mm (average =36.75 x 9.26 mm, Sdev-L=10.89 and Sdev-B=6.90).

b. ***Amorphous cores*** (n=16): These have mean dimensions of 40.25 x 35.67 x 26.73 mm. They are globular, plano-convex or amorphous in shape and appear to be heavily reduced. Cortex is noted in four cases and is <25%. An average of three final blade scars was noted. Most cores are intensively flaked. Blade scars occur around most of the circumference in four cases. In two cores, blades were detached along both faces of the core bidirectionally, utilizing the previous blade scars as platforms. The mean blade scar dimensions are 21.73 x 9.59 mm. A variant of this category is a small group of heavily reduced cores which bear evidence of prior blade detachment, but which have been reduced to being discoidal or globular in shape. Less than 25% cortex is noted in two cases.

Intensively reduced blade cores (n=7): These are intensively reduced cores (mean dimensions of 36.03 x 19.27 x 13.87 mm), generally rectangular in shape, where blade scars are clearly visible. It is unclear as to whether these represent reduced nodules or broken or core trimming elements. They differ from the category of heavily reduced cores where blade or flake scars are difficult to determine. Less than 10% cortex is noted in only three cases. Blade scars are unidirectional and have mean dimensions of 21.64 x 7.43 mm.

Microblade cores (n=14): These are defined as cores for the production of microblades which are <20 mm in length. It is difficult to determine whether these were solely utilized for the production of microblades (mean dimensions of microblade scars is 18.31 x 5.16 mm), or whether they form a continuum with other blade core manufacturing strategies. The cores have mean dimensions of 28.91 x 23.62 x 14.03 mm. In three cases the nodules appear to have been primarily utilized for detachment of flakes. These are larger in size and measure 39.14 x 35.39x 20.21 mm. Microblades have been struck from a single platform. In general, cortex is present in three cases and is <25%. Microblades were detached from a single platform, and average around two blades per core. In one case the core has been retouched to form a borer-like pointed tool. The mean blade scar dimensions are 14.82 x 6.32 mm. A unique variant is a single platform core on a thick flake (47.50 x 32.11 x 14.39 mm). The striking platform has been prepared along the distal end of the flake from

which three microblades were struck unidirectionally. The flake was subsequently retouched with denticulated retouch along one edge as indicated by differential patination.

Flake Cores

A total of 21 flake cores were noted in the assemblage. These have mean dimensions of 64.63 x 50.83 x 34.03 mm. They comprise the following types (Fig. 3).

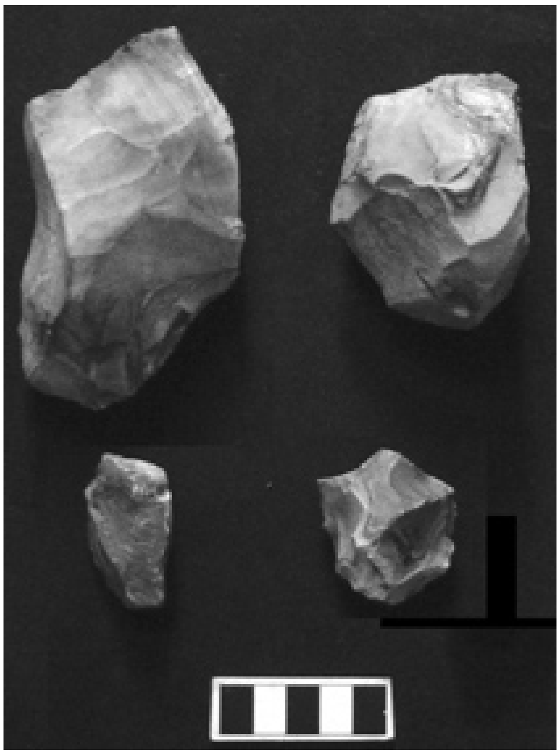


Fig. 3: Flake cores

Prepared Cores

a. *Levallois flake cores* (n=4): The first of this type comprises a small Levallois flake core on a thick flake (53.60 x 57.77 x 20.15 mm). Preparation of the striking platform and detachment of one preparatory trimming flake (measuring 27.34 x 37.30 mm) is noted on the ventral face, which also resulted in trimming of the previous striking platform and bulb. A few flakes were detached along the periphery. The final flake was struck using a striking platform prepared on the ventral face and measures 44.76 x 43.69 mm. A second examples is on a small cortical nodule (measuring 40.16 x 32.92 x 20.89 mm). Two edges have been prepared by detachment of small blade-like scars. One flake has been detached from a prepared platform and measures 20.90 x 24.02 mm. One artefact is on a small nodule (57.99 x 51.65 x 17.50 mm). The dorsal face is partly cortical. The opposite face is intensively flaked, with roughly radial converging flake scars covering the entire surface. Possible preparation of a platform is noted along one end, and it is likely that represents an unstruck Levallois core.

One example represents a possible Levallois core (48.35 x 29.92 x 16.98 mm) on a nodule for detachment of a small pointed blade like flake measuring 28.40 x 16.84 mm. Cortex is noted on one face and it is also intensively patinated and rounded. Preparatory flaking along one edge is noted. The striking platform is prepared at right angles to this edge, from which the final pointed blade like flake was struck.

b. *Discoidal flake cores* (n=2): These measure 45.59 x 43.37 x 27.74 mm. An average of around two to five flakes were detached measuring 22.22 x 27.08 mm.

II. Amorphous flake cores

a. *Globular flake cores* (n=11): These have mean dimensions of 65.29 x 53. 97 x 39.65 mm. A group of eight cores are rounded and on nodules. Five of them have less than 25% cortex, and in one case cortex covers 25-50% of the surface, and in two cases this is unclear owing to the nature of the raw material. An average of three final flakes (33.21 x 37.75 mm) were detached from multiple striking platforms. The cores appear to be heavily reduced.

A variant of this type include four globular cores with one face being represented by a split nodule surface. As indicated by flake scar patterns, the original core or nodule was split subsequent to the detachment of several flakes. The split nodule face was then used as a platform for detachment of further flake scars. Flakes were detached from multiple striking platforms, *viz* the split nodule face; a face opposed to this, and at right angles utilizing previous flake scars. The last generation of flake scars visible average three, although previous generations of scars indicating extensive flaking are seen. In one case, the creation of bi-directional flaking along one edge, appears to suggest preliminary trimming for a ridge for blade detachment, although this is unclear. The mean flake scar dimensions are 36.27 x 22.70 mm. In two cases, the previous scars bear traces of detachment of blade like flakes. It is possible that these represent remnants of larger blade cores.

b. T*abular flake cores* (n=3): These are tablular cores on nodules or split nodules (77.15 x 48.92 x 33.55mm). In one case cortex is noted on both faces, while in the remaining two cores, only a small fraction of one face is cortical, and thus these may represent remnants of larger cores on tabular blocks. In all cases, parallel flakes were detached unidirectionally from a single platform along either one face (two cases) and from two faces (one cases). In one example it is unclear as to whether flakes were detached with the added intention of creating a ridge to be subsequently used for blade detachment. The flakes have mean dimensions of 25.67 x 22.34 mm.

c. Elongated core on nodule: (n=1). This is on an elongated nodule, with <25% of the original cortex retained. The core is flaked all over, and two of the last flake detachments are noted from a prepared platform along one end of the core. A previous detachment of a long blade like flake is also noted. Extensive preparatory scars at the opposite end of the core, along with flaking suggestive of possible creation of a ridge, may indicate that this was intended for detachment of blades or flake-blades, which was however not completed. The core measures 115.76 x 64.83 x 41.21 mm, and scar dimensions average 29.83 x 27.25 mm.

Intensively reduced blade/flake core remnants

These include a total of 25 heavily reduced cores. In 16 cases <25% cortex covers the surface. It is difficult to estimate the number of blades or flakes detached as also the nature of striking platforms. They have mean dimensions of 36.37 x 28.11 x 20.67 mm.

Debitage

Debitage associated with blade manufacture include core tablets (n=4), core trimming elements (n=11); outrepasse flakes (n=2), crested guiding ridge flakes (n=9), broken blades (n=8) and broken retouched blade (1). A significant category includes blade core trimming flakes with evidence of prior blade scars on the dorsal face (n=13). It is not always clear in this category whether they represent blades on flakes or trimming elements. On an average 2-3 blade scars are noted with dimensions. In most cases the blade scars are standardized and these appear to derive from fluted cores. Blade core rejuvenation flakes or core trimming elements with evidence of detachment of microblades are noted in nine cases with mean dimensions of 43.38 x 28.37 x 9.29 mm. Microblade dimensions are 15.45 x 3.93 mm.

Discussion

The principal raw material utilized comprised siliceous rocks with a predominant use of chert. Chert occurs as outcrops within the Rajmahal Traps, exposures of which were noted at Parerkola, Gamharia, Sonajori, Jhenagaria and Chitlo. At Gamharia, the outcrop could not be located, but was presumed to be in the vicinity owing to the presence of large chert nodules around 30 cm in length. Sites were noted at or near all these sources. Cherts which are weathered from outcrops do not generally move very far from their source (see Luedtke 1992: 102). However, over most of the study region, chert occurs in the form of smaller nodules. It is possible that these represent; a) nodules distributed through fluvial processes; or b) weathered previously from outcrops which are not visible today. The latter possibility is considered more relevant, as the chert nodules are neither rolled nor do they display any evidence for fluvial transport, except when noted in stream channel beds. Brownish chert predominates as described above.

The mean dimensions of natural nodules is 30.07 x 20.96 x 12.99 mm (ranging from 6.99-125.42 mm, Sdev=15.42). Most nodules fall between 10-40 mm in size, with a smaller percentage occurring between 40-60 mm. In general, raw material nodules from Ranga, Rurgo Pahar, Saolapur, Kirla Nadi and Dohri Padar are larger in size than those at the other sites. However, chert blocks eroding out of the basalt can measure upto an average of 30-40 cm and were surely exploited, although evidence of preliminary trimming of these are yet to be noted. Core sizes roughly correspond with or are larger than the size range of natural nodules available, although no cores or natural nodules suitable for detachment of flakes or blades >40 mm are seen. At present, no variability in raw material types between sites can be seen.

Cores form only a small percentage of the total assemblage, and do not predominate at any site. A higher percentage of cores is noted in and around, Taljhari, Chitlo and Kariodih, all of which are within a radius around 2 km from the Jhenagari and Chitlo chert outcrops. As noted earlier, cores are smaller in size than the nodules available locally, and no cores suitable for the detachment of blades >40 mm were noted. Cores comprise both blade

and flake cores. Flake cores are however minimal in the assemblage comprising only 19.09% of the total number of cores. This is a striking fact when compared to the high percentage of tools on flakes; and when compared to data provided by Chakrabarti (1993: 105-106) who mentions a total of 54 cores, 58 retouched cores and only four blade cores from this industry, along with six retouched cores and six fluted cores from the microlithic industry.

Amongst the flake cores, possible Levallois cores are noted in four cases, of which one appears unstruck, and one of which was aimed at the detachment of a small blade-like pointed flake. Levallois blades are seen in the assemblage but no corresponding cores were noted. In general flake cores are amorphous, globular or tabular cores on chert nodules or split nodules and tabular blocks. Most cores are heavily reduced with little evidence of cortex. The predominant blank type preferred for tool manufacture was flakes. The size range of tools on flakes averages 35.91 x 30.69 x 11.73 mm which roughly corresponds to the size ranges of flake scars on the cores (39.10 x 26.36 mm). Striking platforms for flake tools are mostly plain (n=113), with only three being cortical, facetted (n=63) while the rest are indeterminate or trimmed. Only a few flakes may be said to bear evidence of some type of Levallois flaking as based on dorsal flake scar patterns. This is however not very clear, and dorsal flake scars are either uni/bi directional in nature.

The paucity of flake cores as compared with the abundance of tools on flakes may be explained in two ways:- a) the preliminary trimming of flake cores elsewhere; b) the detachment of flakes was a part of the general blade manufacturing strategy as a result of which cores were being totally exploited for both flakes and blades, and thus were heavily reduced. The second hypothesis appears to be more plausible when examining evidence in other parts of the world and the nature of cores in the present industry. In particular, several flake cores do appear to have evidence of prior detachment of blades.

The core reduction strategy was predominantly oriented towards detachment of blades (Fig. 4). Blade cores comprise 58.18% of the total number of cores. Single platform cores predominate of which a small number representing standardised pyramidal or rectangular fluted cores are noted. Most blade cores are intensively reduced. The presence of a small number of opposed platform cores, and cores with changed orientation or multiple platforms also point to the intensive exploitation of raw material at these sites. Blade cores are either smaller or roughly similar in size to nodules. Thus, taking into consideration their reduced nature, and preliminary trimming it is thus likely that larger chert nodules were originally chosen, evidence of primary flaking of which has not yet been located. Although the number of blade scars visible on the core number average around three to four, intensive detachment of several generations of scars can be noted.

The small but significant presence of cores for detachment of microblades (<2 mm) is important. These are possibly what Chakrabarti (1993) classifies as constituting part of the microlithic blade cores in the industry. These cores are on heavily reduced nodules, and evidence of core rejuvenation flakes and core elements with microblade scars are also noted. While some cores appear to be specifically geared towards production of microblades, others have evidence of previous flake detachment followed by blade removals. The distinction between blades, bladelets and microblades (see Inizan *et al.* 1999: 73) is often variable, and based on guidelines specified within an industry at a site or within a region. The available sample size is very small and from surface collections. Thus quantifying variability in core types for detachment of larger, medium or smaller blades, bladelets and microblades is often not very clear. It must be remembered that types may often grade into each other depending on the stage in the reduction sequence represented. Thus, at this stage of research, it is preferred to regard these as constituting an integral part of the industry and blade core technology of the region.

A wide range of blades are noticed in the collection (n=41). The mean dimensions of blades are 40 x 21.91 x 9.79 mm with length ranging from 17.42 mm to 89.27 mm, which roughly correspond to scar dimensions on some cores. However, despite the presence of fluted or standardised blade cores, there are few blades which correspond technologically with these cores. Blade cores for the detachment of large blades (with scars measuring around 37 mm) are only three in number, despite the predominance of such blades in the assemblage. Although possible Levallois blades are noted, no Levallois blade cores were

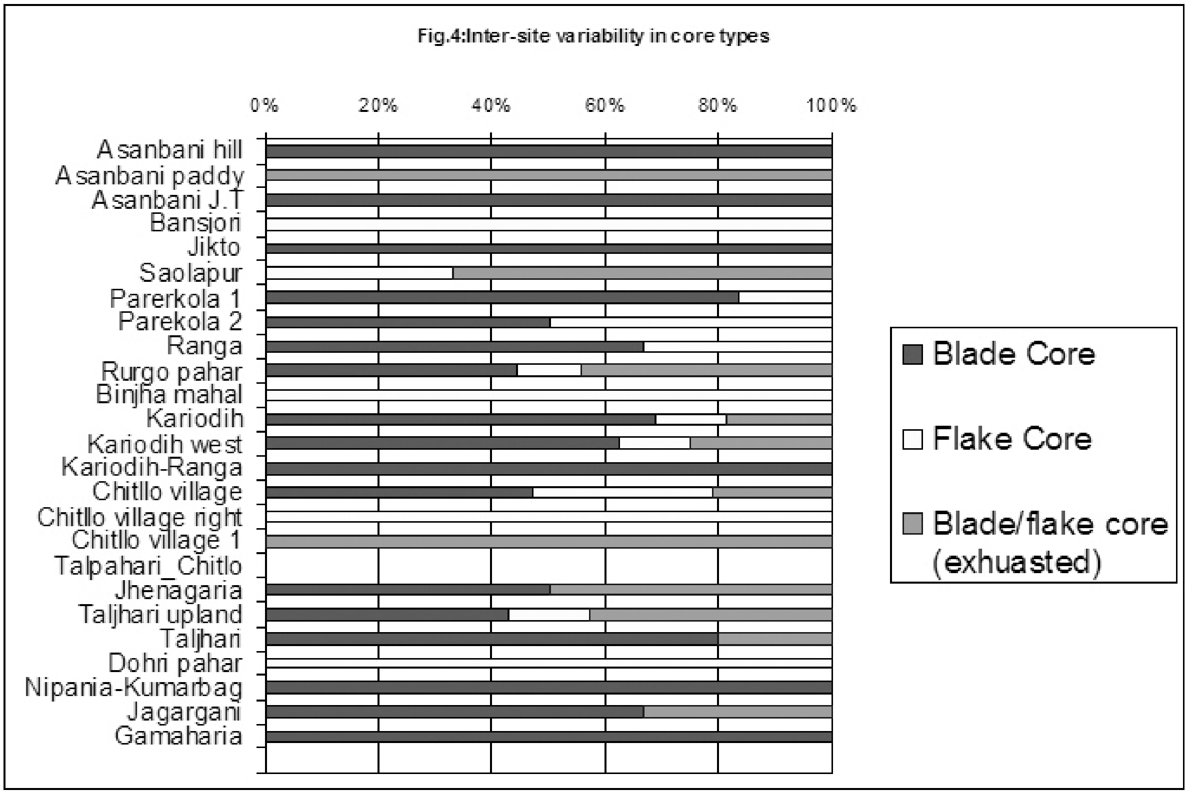


Fig. 4: Intersite variability in core types

seen, with only one possible Levallois core for the detachment of a pointed blade like flake being noted.

Tools on blades number only 28 (with mean dimensions of 46.76 x 25.11 x 11.08 mm), and ranging from a minimum of 24.28 mm in length to a maximum of 89.27 mm. Eight tools have some degree of cortex with cortex percentage being less than 25%, while one had 25-50% of the surface cortical. In three cases cortex was noted along the striking platform, in four cases along the mesial part of the dorsal face and in one case along the mesial right (as cortical backing). In most cases striking platforms were plain, with crushed platforms in three cases the rest being either trimmed or indeterminate, and lips are noted in only a few cases.

Dorsal scar patterns on blades point to tools with a central dorsal ridge alone, and those with previous scar removals pointing to detachment from single or opposed platform cores. Despite the number of microblade cores, only two such blades were noted of which only one is retouched (backed). One is retouched along one edge and the striking platform and bulb are either broken/truncated. The second example has evidence of previous microblade scar detachment.

The presence of debitage indicative of core trimming and rejuvenation, such as outrepasse flakes, core tablets and core rejuvenation flakes and other core and microblade-core trimming elements points to some degree of rejuvenation of blade cores.

To summarise, raw material utilized comprised chert and other siliceous material derived from weathered outcrops in the Rajmahal Trap, and in the form of smaller nodules distributed over the region. Preliminary analysis points to the predominance of blade core manufacturing strategies as seen in the cores; although the assemblage is marked by a paucity of blades and predominance of flake tools. No evidence of preliminary trimming of large blocks was noted, although this may be expected in areas closer to chert outcrops. The paucity of flake cores despite the predominance of tools on flakes may be attributed to strategies involving use of flakes produced as a result of the blade core

manufacturing process. The paucity of blades in the assemblage, along with a lack of correspondence between the blades noted and the type of cores found; points to considerable transport of blades and cores across the landscape. Further, the intensive and reduction of nodules is an important feature of this industry, as also the reuse of flakes as cores and the repeated rejuvenation of cores. Further studies of the entire assemblage are in progress in order to situate this industry within the broader context of the Eastern Indian Upper Palaeolithic.

Acknowledgements

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Prehistoric Pottery Industries along the 'Lost' Sarasvati River of the Great Indian Desert.

Katy Feroze Dalal (nee Katy Nariman Frenchman)

The thesis titled 'Prehistoric Pottery Industries along the 'Lost' Sarasvati River of the Great Indian Desert', was completed in 1972 under the guidance of Dr. V.N. Misra. It consisted of two volumes (Volume I – pp. 345 and Volume II- Plates and Figures 126). Volume I contains ten chapters. They are: I. Introduction, II. A geographical survey of the Sarasvati-Ghaggar Valley, III. A short history of archaeological explorations in Sri Ganganagar District, IV. Further explorations along the Sarasvati-Ghaggar and Drishadvati rivers, V. A brief survey of the relative and absolute chronology of Pre-Harappan sites in India and Pakistan, VI. Kalibangan, VII. Pottery from explored sites: Types and their comparison, VIII A. Pre-Harappan motifs from the Sarasvati and Drishadvati valleys: their description and comparison, VIII B. A comparative study of incised designs, IX. The trial dig at Binjor I, and, X. Conclusion.

In the year 1967 very few people had knowledge of Pre-Harappa pottery cultures which were found in the Sarasvati Valley of Rajasthan. It was only when Shri Amalananda Ghosh read his paper "The Indus Civilization. Its Origin, Authors, Extent and Chronology" at the Prehistoric and Proto-Historic Seminar held at The Deccan college in Pune in 1964 that archaeologists really became aware of Harappan remains in the Sarasvati-Ghaggar Valley. What was even more important was the find of an even earlier culture at Kalibangan – which he called Sothi after its type-site- which Ghosh thought might have given birth to the Harappa Culture. He also went on to say that this Sothi culture, as found at Kalibangan Period I, was akin to the Pre-Defence culture of Harappa found by Sir Mortimer Wheeler below the rampart at Harappa in 1946 and the Pre-Harappan culture of Kot-Diji.

This theory aroused keen interest in me and, therefore, I thought of pursuing the clues provided by Shri Ghosh. By now it was clear that the Sarasvati Valley in North-west Rajasthan had nurtured several cultures in the remote past and only a fresh exploration coupled with a thorough study of all the available material could reveal their geographical distribution and chronological relationships.

Despite its great archaeological potentialities, the Sarasvati-Ghaggar Valley had not, so far, received the attention it deserved. It had been an unlucky area for explorers.

It had been explored in 1918 by Dr. L.P. Tessitori and in 1942-43 by the renowned explorer Aurel Stein and later by Shri Ghosh in 1952-53, by Dr. Hannah Rydh in 1959, and by Henry Field, also in 1959. Sir Aurel Stein's detailed accounts of his exploration between Hanumangarh in India and Derawar in Pakistan were very crucial to my study. I came across his short paper in the Geographical Journal (1942). The report was extremely brief but I managed to strike gold when I got access to his unpublished report 'An Archaeological Tour along the Ghaggar- Hakra, 1942', which was somehow smuggled out of India and was found in the possession of the Library of Congress, Washington, DC, USA.

I was now able to put all the explored accounts together, in a monograph (Dalal 1980), for the Heras Institute of Indian History and Culture, St. Xavier's College, Mumbai. Stein had come across numerous mounds of Pre-Harappan culture without realising their true value. I was able to make a list of his finds and make tables listing their finds.

I first proceeded to the sites Sothi and Nahar. The latter lay on the Drishadvati River. Sothi was the mound where Ghosh had found Pre-Harappan remains. It was in a very bad condition. There was no question of obtaining a stratigraphic sequence. I was able to collect a fantastic array of incised wares. In London, in 1968, I visited Miss. Beatrice de Cardi, excavator of sites in Eastern Iran and Dr. Sefton Lloyd, the excavator of Hassune. Both said they had seen nothing like it (Figs. 1, 2, 3, 4). It is only at Kalibangan I that this ware, which Mr. B.K. Thapar and Mr. B.B. Lal called Fabric D, is found in great numbers (Frenchman 1972 [Vol. II]: fig. 117; Lal, Thapar, Joshi, Madhubala 2003: 207-11, figs. 54, 55)

The Kalibangan I pottery had been divided into six distinct fabrics, A-F.

Fabric A- red to pink in colour, painted in black, at times with hatchings in white.



Fig. 1: Incised vase

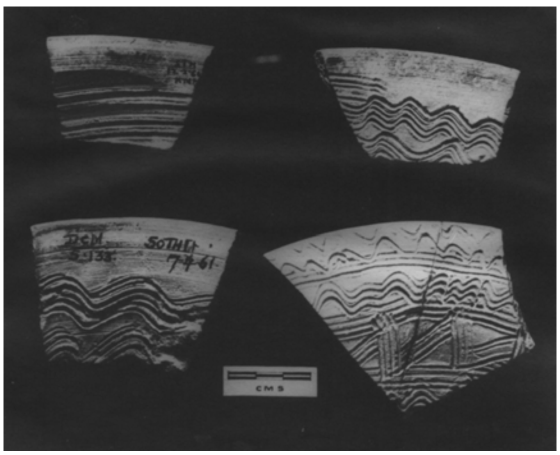


Fig. 2: Internally incised bowls

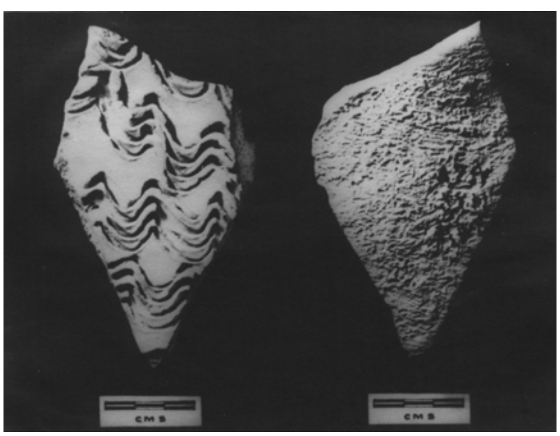


Fig. 3: Rare incised and dendritic sherds

Fabric B- (*IAR* 1962-63: fig. 4) is red, slipped up to the shoulder and decorated with black horizontal bands. Below the shoulder it is covered with a clay and sand solution, roughened at the wet stage with wavy lines or dendritic impressions. Please check fig. 3, where we have a rare sherd from Sothi which is heavily incised internally and has a dendritic application on the outside. No such sherd has been found elsewhere. Fig. 4 shows a striated sherd.



Fig. 4: Incised and dendritic sherds

Fabric C (*IAR* 1962-63: fig. 5) is remarkable in that it is covered by a red or plum coloured slip, and painted in black by horizontal lines, latticed loops and triangles.

This is a very rare coloured slip. The only other slip is the one on Halafian vessels. I was able to examine the Halaf ware from Arpachiyah at the London Museum and was shocked at the similarity.

Fabric D (*IAR* 1962-63: figs. 6 & 97) is red slipped and thick sectioned, made up of jars, basins or troughs, often internally ridged.

Fabric E (*IAR* 1962-63: fig. 7) is buff slipped, the shapes include jars and dishes on stand. The decoration consists of lines, fronds, sigmas, scale borders, and multi-petalled flowers (?). Double-axe (*parashu*) design also occurs on this ware.

Fabric F (*IAR* 1962-63: fig. 9) is a small collection of grey ware. The main shapes are vases, basins and dish on stand, painted with white hatchings.

All these fabrics were found at Sothi. I continued my search along the Sarasvati, which yielded some fine results (Fig. 5).

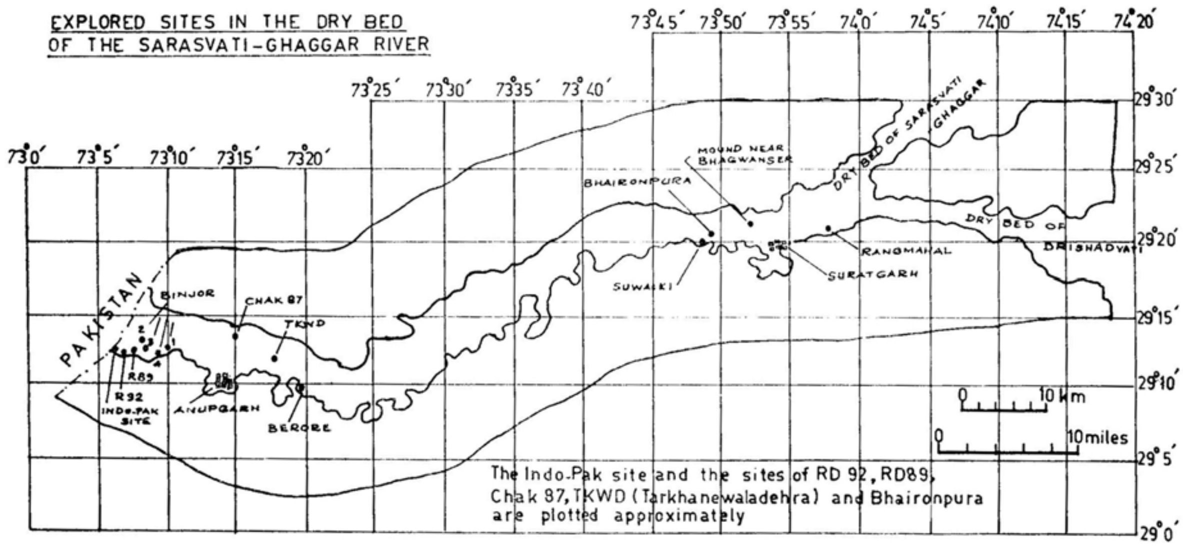


Fig. 5: Explored sites in the dry bed of the Sarasvati-Ghagar river

The site of Binjor 3 yielded a beautiful collection of bichrome black-on –buff ware, (Fig. 6) as well as thick Parallel Striated ware (Fig. 7). It also yielded Fabric C type plain and black painted Red ware (Figs. 8 & 9).

Also in Fabric C ware Binjor 3 yielded a collection of sherds painted with bull horns (Fig. 10) erroneously described (Lal *et al.* 2003:103) as 'moustache like bifold scroll'.

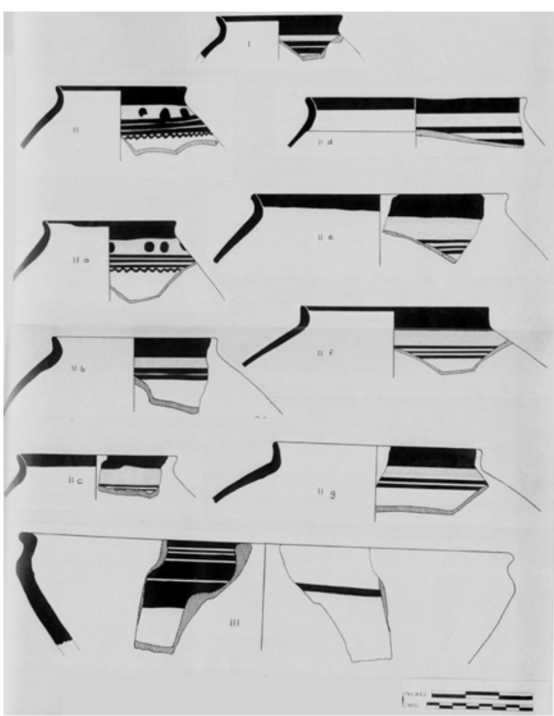


Fig. 6: Prehistoric bichrome black-on-buff red ware

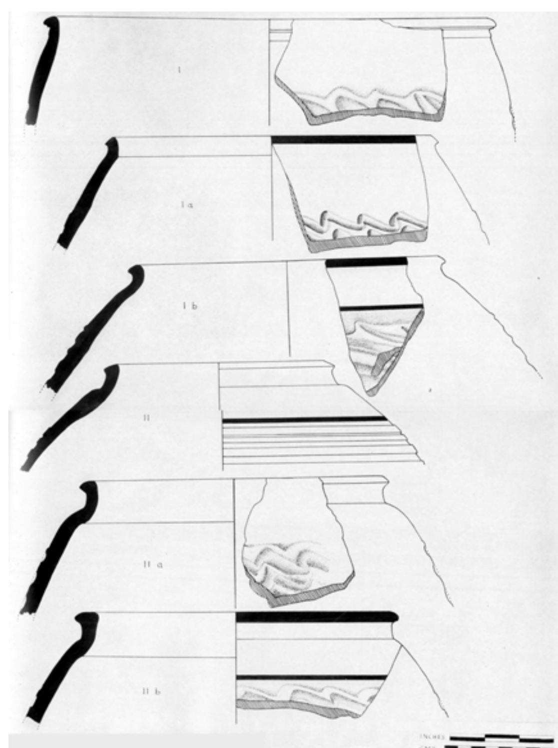


Fig. 7: Binjor 3: Prehistoric thick parallel striated red ware

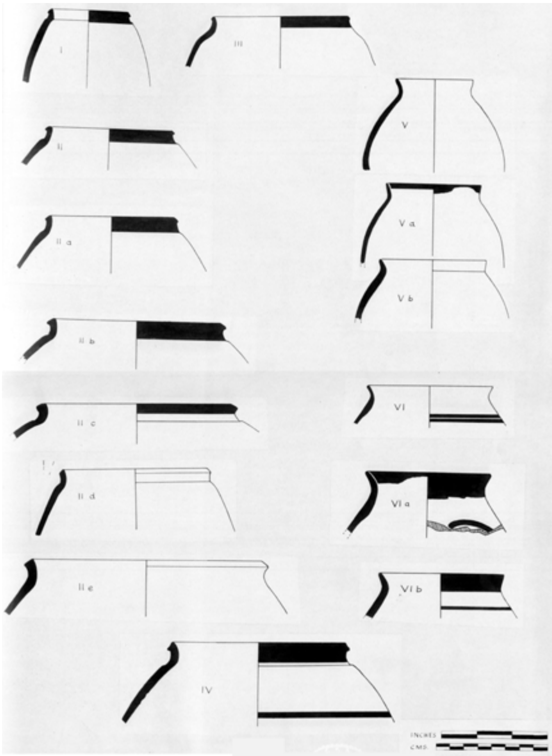


Fig. 8: Prehistoric plain and black painted red ware

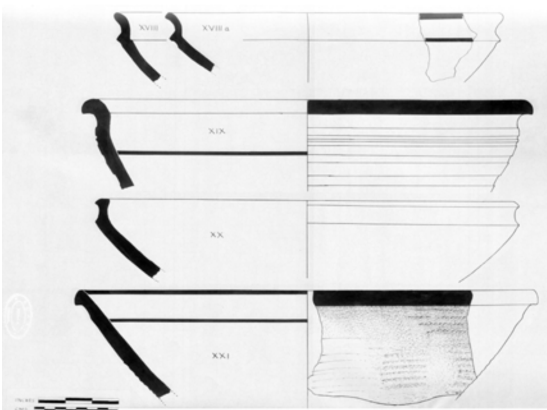


Fig. 9: Binjor 3: Prehistoric plain and black painted red ware

Site RD 89 yielded Hakra-type black painted vessels (Fig. 11) as well as an Amri type sherd, red slipped and black painted, black and buff on red ware and dendritic ware which, according to Rafique Mughal (Personal communication), go back to 4000 BC (Fig. 12).

The site of Binjor I close to the Bahawalpur – Bikaner border, was my greatest find. Here, a small trial dig was undertaken. The objective of this limited dig was to obtain a stratigraphical framework for the western part of the Sarasvati-Ghaggar Valley which could be used for assigning the materials from the surface sites. For the eastern part of the valley an excellent framework already existed from the site of Kalibangan. The Binjor evidence would also confirm thus in a very limited manner as to how far this cultural sequence in the western part of the valley tallied with its eastern counter part.

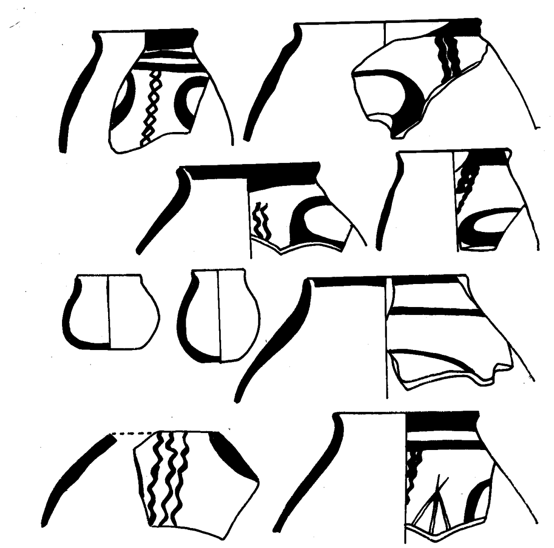


Fig. 10: Prehistoric plain and black painted red ware

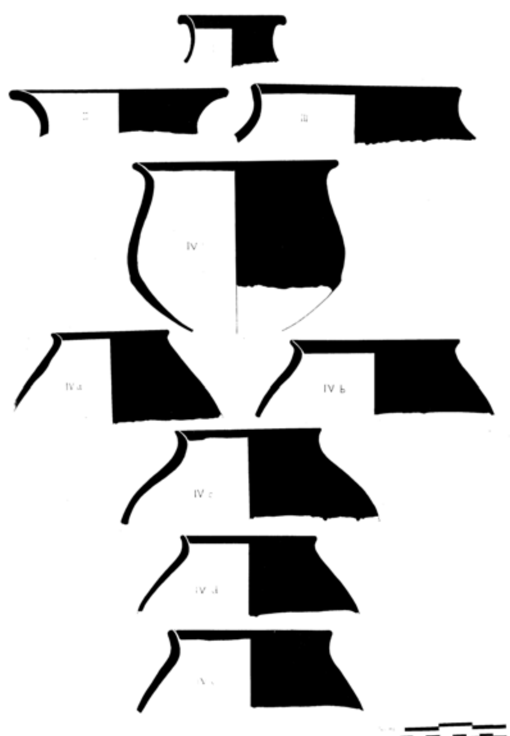


Fig. 11: Externally black painted red ware

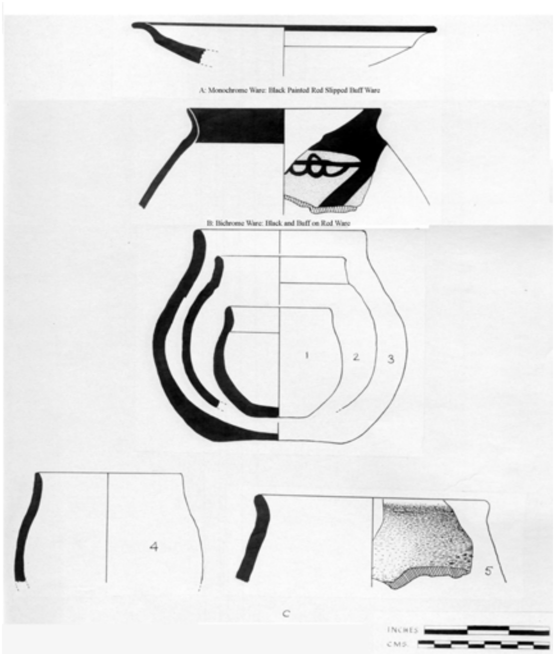


Fig. 12: Prehistoric monochrome, bichrome and dendritic red ware

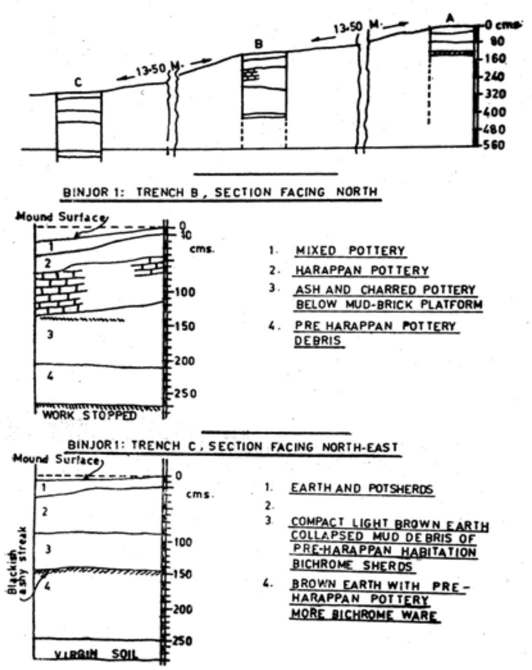


Fig. 13: cross section of trenches A, B and C on eastern slope of mound Binjor I

The excavation was carried out on a very small scale (Fig. 13). In all, three trenches A, B, and C were laid. Although the results were very encouraging, because of the restricted size of the dig, conclusions drawn were only of a tentative nature. A cultural sequence of three periods ranging from 3000 or 2700 BC to 500 AD was obtained. The relative dating was based on a comparative study of pottery and other finds from sites in Sind, Punjab and Rajasthan.

We found a pot with burnt food remains at Binjor I. Unfortunately the Deccan College did not send it to TIFR for dating.

The earliest culture, period I, was found in the lowest layer of trench C. Its pottery bears close resemblance to wares from Pre-Harappan Kot-Diji as well as from Kalibangan I. Period II found in Trench A and the three top most layers of trench B

Comments

Because of the absence of the censer (perforated jar) at Amri Pd. I A, Kot-Diji early levels and the Pre-Harappan levels of Harappa Cut XXX and from its appearance at later stages, it has been said that it was introduced by the Harappans to the Pre-Harappan communities (Manchanda 1960: 171). It has further been stated that the censer reached Amri from Chanhu-daro, and Kot-Diji from Mohenjo-Daro. Harappa, being some distance away, is presumed by Manchanda, to have missed the censer impact (Manchanda 1969: 171).

Manchanda has tried to trace the ‘evolution’ off the censers at the Pre-Harappan centres of India as has been noticed at Mohenjo-Daro and Chanhu-Daro. The squat type appears before the tall type and gradually diminishes and transforms into a broad medium-high squat stand, profusely decorated on the exterior (Manchanda 1960: 169). On the absence of the squat variety at Kalibangan I, she has suggested this site is ‘younger’ than the pre-Harappan sites mentioned above. Furthermore, it is said that the Kalibangan I censer, with short projected rim and bowl on stand, suggests ‘the route of penetration of the Harappan ideology from the direction of Harappa via the river Sarasvati rather than from Mohenjo-Daro. Thus the offering stand which was a cultural concomitant of the Harappans was copied ceramically by the so-called Pre-Harappans when they came in contact with the Harappans (Manchanda 1969: 171-172).

How such sweeping statements were made is an enigma. There are certain discrepancies in these statements. Two chalices from Kalibangan I, one in Fabric C (*IAR* 1962-63: fig. 5: 16) and one in Fabric E (*IAR* 1962-63: fig 8: 12) have been wrongly illustrated as censers inspite of being

totally different types. Six other illustrations consist only of stands (Manchanda 1969: 164 figs. 1, 2; 165: figs. 3, 5; 167: fig. 6; 168: fig. 10) upon which conceptions have been based without taking into consideration the fact that the existence of the stand does not mean that it had to have a dish of a particular nature superimposed upon it.

At Binjor I, which is closer to the Bahawalpur-Bikaner border than Kalibangan I, in the very restricted area in trench B, three censer dishes were found in the early undisturbed pre-Harappan layers. These had an all-over plum-purple slip with simple decorations on the internal rims. This leads one to suppose that censers were not as rare in pre-Harappan layers as had been implied above, especially since no sherd count has been published of the Kalibangan I material.

An overall study of the pre-Harappan cultures leads one to suppose that it could possibly have its roots in western Asia. The censer, then, instead of merely being a borrowing from the Harappans might conceivably be a legacy derived both, from a third common source, such as Kish or Jemdet Nasr.

Our knowledge of the pre-Harappans is too slight for sweeping statements to be made regarding their borrowing of Harappan traits. The latter, arriving as infiltrators into the Sarasvati Valley could not have so endeared themselves to the earlier communities that they even adopted traits. The latter would be possible only under duress or after a long period of mingling together.

Another statement has been made regarding jars with perforated flanges. It is said that the ‘variety in shape and decoration of these jars and their spread in time and space to Rajasthan and Saurashtra is due primarily to Harappan influence’ (Manchanda 1969: 221). That the Harappans may have derived this particular style from the pre-Harappans is more than evident from my explored material (Frenchman 1972: II; fig. 17: XII, fig. 30, fig. 66: XVII-XVIId, fig. 75: XI-XIV). It is even to be met with in Baluchistan (Frenchman 1972: fig. 17: A, B) and in Punjab at Wheeler’s Cut XXX below the ramparts at Harappa. Wheeler (1947: 95) has clearly stated that this flanged jar is found at Harappa but is not present in the mature Indus ceramic assemblage of Mohenjo-Daro.

Owing to some unknown, inexplicable reason, the flanged jar became extremely popular in the Sarasvati-Ghaggar Valley where and at every single pre-Harappan and Harappan site in both levels (Frenchman 1972: fig. 17: XVII; fig. 25: VII, fig. 30: V; fig. 35: 10; fig. 57: 4; fig. 59: 3; fig. 66: XVII; fig. 69: 8; fig. 75: XI; fig. 79: IV; fig. 97: XXIII). Since a later element cannot influence that which was in existence before it, we can safely presume that the Harappan flanged jar in Rajasthan was the direct outcome of the existing pre-Harappan type in this area. When the Harappans reached Saurashtra they brought with them a type which was pre-Harappan in origin and usage.

Terminology

Cultures are named after the sites where characteristic types of craft are first discovered (Wheeler 1968: 2). Since the characteristic dendritic, incised bichrome and monochrome wares of the Sarasvati-Ghaggar Valley were found first at Sothi, the culture characterized by these wares should be called after this site alone. Since the same wares are found at the excavated site of Binjor I and on the surface of the mounds of Nahar, Tarkhanewala Dehra, Berore, Binjor 3 and RD 89, the term Sothi can equally well be applied to them. It is also possible that these sites possess the same culture sequence as Binjor I and Kalibangan I.

Ghosh (1965: 116) had at one time felt justified in calling the Sothi culture proto-Harappan. A detailed study of excavated sites in Pakistan (Amri, Kot-Diji, Gumla, Harappa Cut XXX, Sandhanawala Ther) shows a startling contrast between pre-Harappan wares and those of the Harappans. The difference is distinctive and well marked enough to imply separate cultural entities (Khan 1965: 43; Wheeler 1968: 20).

Origin

So far, no satisfactory theory has been put forth regarding the origin of the pre-Harappan culture of the Sarasvati-Ghaggar Valley. Thapar (1965: 11) has merely mentioned that the pre-Harappan sites of Harappa, Kot-Diji and the Sarasvati-Ghaggar Valley may be the result of an expansive movement of village communities sharing certain basic elements, but, evolving their own patters in each region. What the basic elements are, or what ‘pattern’ the cultures are said to evolve from or from which geographical region they originated first, is not mentioned.

The Allchins (Allchin and Allchin1968: 123) assign Kalibangan with affinities to a ‘Pre-

Harappan Indian Culture Phase' and frame the question 'what were the Indian Cultures which influenced the Kalibangan province and what in turn were their cultural antecedents?'. They themselves have no answer to give.

There is as yet no evidence at all of a culture earlier than Kalibangan and Binjor I in Rajasthan to which we could assign the origin of 'Indian Culture Phase'.

Mallowan and Rose (1935, II: 178) had suggested three decades ago that 'on the fringes of India there are certain wares which bear at all events a superficial resemblance to the Tel Halaf ware. In particular, the polychrome sherds of Sur Jangal and related wares in feel, colour and minuteness of design bear an apparent kinship to that of Tel Halaf'. It is not known as to how detailed a comparative study Mallowan made of pottery from Tel Halaf and Sur Jangal. But the same is even truer of the Tel Halaf ware when compared to the bichrome Kalibangan I ware.

A detailed study of the evolution of the buckranian design at Tel Halaf explicitly shows how the natural animal head came to be so stylized that finally there was no resemblance between the original and the evolved design. At Tel Halaf we have the stylized naturalistic buckranian at its early stage (Mallowan and Rose 1935: II: fig. 74: 1-5) its development at a later stage (Mallowan and Rose 1935: fig. 74: 6-11), the vertical buckranian design (Mallowan and Rose 1935: fig. 74: 12-16) the latest stage in the horizontal buckranian design (Mallowan and Rose 1935: fig. 74:17-25), stylised horns (Mallowan and Rose 1935: fig. 75: 1-10), double axe, checker pattern and moufflons (Mallowan and Rose 1935: fig. 74: 17-25), all developments from the original animal head.

Almost identical designs are present at Kalibangan I, all the designs being stylisations. Only one exception exists, the head of a bull on Fabric B type pottery (*IAR* 1962-63: fig. 4D).

Unfortunately the excavators of this early pre-Harappan site have thoroughly misunderstood the unique quality of their finds and whenever these stylised horns were illustrated they were erroneously described as 'moustache-like bifold scroll'.

I give a list of designs which have been printed in the *IAR* (1961-62 and 1962-63) and which I believe to be stylised versions of the buckranium motif (*IAR* 1961-62: fig. 13: 15, 20; fig. 14: 26, 33, 36, 37, 41, 42; *IAR* 1962-63: fig. 2: W, Y, AA, AB, AF, AG; fig. 4: 3: A, D, J, K).

Empanelling of the design is an indication of an early date at Tel Halaf (Mallowan and Rose 1935 II: 155). It is a strange fact that most of the bull-horn designs are empanelled, both from Kalibangan I (*IAR* 1961-62: fig. 13, 15; 1962-63: fig. 2: W, Y) and Binjor 3 (Dalal 1980: fig. 7: I-IV and VIa).

As far as the naturalistic designs are concerned the one and only natural buckranian head from Kalibangan (*IAR* 1962-63: fig. 4: D) bears a startling resemblance in the treatment of its horns, ears, eyes and nostrils (Fig. 12: 1, 2, 3, 4 and 10) of Arpachiya.

A glance at fig. 14 is sufficient for us to notice how at Kalibangan it is only the later stylisation which has endured. The reason for this is very obvious. Whoever introduced this Halafian element into the Kalibangan milieu was familiar only with the later artistic achievements of the Halafians.

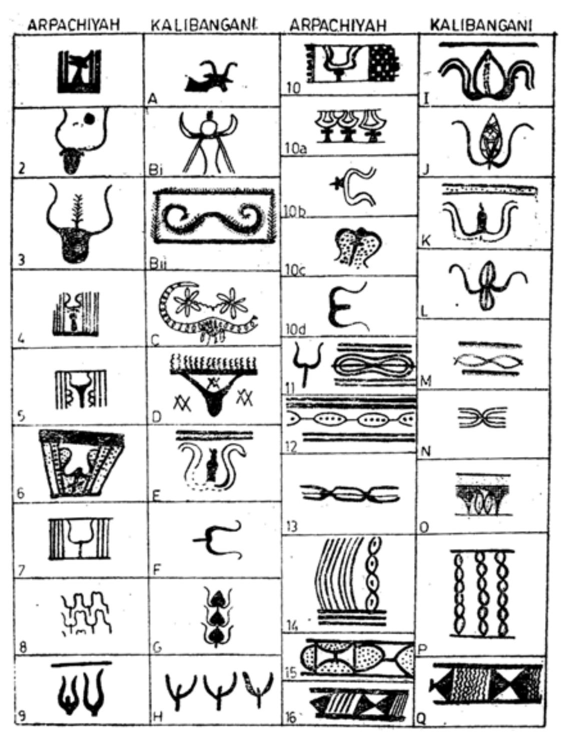


Fig. 14: A comparison of Harappan motifs from Aprachiyah and pre-Harappan motifs from Kalibangan I period I.

Conclusion

1. The thesis established the presence of Hakra ware for the first time in India thereby pushing back Harappan antecedents in India to the 4th millennium BC (Dalal 1981; Mughal 1971)
2. It revealed a sequence of pre-Harappan sites along the Sarasvati with similar affiliations and idiosyncrasies to those first seen at Sothi thereby vindicating A. Ghosh.
3. The excavations at Binjor I revealed a clear break between the pre-Harappan and Harappan horizons thereby indicating a possible 'second' wave of Harappan colonisation of the Saraswati-Ghaggar valley.
4. The explorations established a progression of sites extending eastward along the Sarasvati that appear to be in a chronological sequence by observing the incidence of flanged vessels and their apparent decrease in numbers, variation and size as one proceeds towards the east from Binjor to Kalibangan (Lal *et al*. 2004). Thereby predating Joshi's (1981) hypothesis that Harappan migration into the Ganga valley took place upwards along the Sarasvati-Drishadvati complex and perhaps thus explaining possibly the lack of pre-Harappan sites in the Punjab.
5. It also established the drying of the Sarasvati during the pre-Harappan phase by plotting the incidence of habitations and their movement up river vis-à-vis cultural and chronological change.
6. One of the most enigmatic findings of the study was the interesting similarity in evolution of pottery designs between the pre-Harappan and Tel Halaf ceramic traditions even though they are separated in time by 2000 years, thus pointing to a possibility of Halafian influence on Harappan evolution.

Suggestions in the light of New Research

Tragically almost no new work has emerged from this region since the completion of the thesis. The digging of the Gang Canal (now called the Indiara Gandhi Neher) has led to the availability of water in parts of Rajasthan that had barely enough precipitation for a single crop. This has led to excessive cultivation and the levelling of almost all ancient mounds in the area under discussion (V.S. Shinde and R.S. Bisht, Personal communication).

It is only in recent years with the renewed interest in the antecedents of the Harappan culture in the light of the excavations at Banawali, Dholavira, Kuntasi, Padri, Bagasra and Rakhigarhi that the ASI has once again turned towards this region. The lack of interest and follow up work is probably due to the fact that the most important excavations of this region – Kalibangan remained unpublished till this year. Even today only a single volume referring only partly to a single section of the project has been released.

The need of the hour is for a series of small and medium excavations at a large number of sites belonging not only to the Hakra, Sothi and Harappan cultures but also those of the PGW, Rang Mahal and Medieval traditions.

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Archaeological Explorations in Kumaun Himalayas

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Summary of the Thesis

I completed my dissertation titled *Archaeological Explorations in Kumaun Himalaya* (1993) with the aim to understand the Pre and Protohistoric cultures of this mountainous region. The dissertation has six chapters: Introduction, Rock Art, Megalithic Burials, Ancient Mining and Smelting, Ethnography and Conclusion. Besides, an appendix has also been provided, illustrating the scientific analysis of the archaeological material from Kumaun.

The first chapter deals with a brief description of discoveries made by earlier scholars. This chapter also highlights the main issues of archaeology discussed in different chapters of the thesis, besides problems and perspectives of archaeology of Uttaranchal. The second chapter is devoted to the documentation and analysis of prehistoric rock art of Uttaranchal. To study the rock art I copied around hundred and seventy paintings from different shelters, and a tentative chronostratigraphy was established.

A few cist burials were also known from Uttaranchal before I started working for my thesis. I, therefore, carried out an extensive survey and discovered several cist and other burial complexes. The third chapter deals with the variety of burials that are found in Kumaun. I have attempted to distinguish the oldest burial type i.e., cists in this region. Pottery, plant and faunal remains obtained from these burials were carefully studied and analyzed. A brief summary of these analysis has been included in this paper. A variety of cupules, cup like marks, conical pits and some large pear shaped pits had already been discovered from this region. While exploring for ancient sites I also located hundreds of similar pits in hard rock exposures. Elsewhere they have been either associated with rock art or Megalithic culture. Therefore, they were recorded in the thesis. Kumaun has a strong tradition of archaeometallurgy and therefore, I carried out an extensive survey to locate ancient mines and smelting sites both for copper and iron. Some ore samples were analyzed at Deccan College by the XRD method. The analytical results have also been included in the thesis. Since this archaeometallurgical data was quite interesting in understanding the beginning of metal technology in the Himalayan region, I have devoted a full chapter on this aspect. The sixth chapter deals with the ethnographic study of Kumaun region and the results are concluded in the last chapter of the thesis.

The Archaeology of Uttaranchal

Introduction

The new state of Uttaranchal in North India, in Central Himalayas (Fig. 1), comprises the Kumaun and Garhwal divisions. The history of archaeological researches goes back to the 1850s when Henwood (1858) discovered a few cup marks and cairns from Devidhura in eastern Kumaun. Subsequently, Carnac (1877) also brought to light similar evidence from Chandeshwar in Almora district. Atkinson (1884) did commendable work by writing a comprehensive history of this Himalayan region in his Gazetteers. Thanks to the efforts of illustrious scholars like B.D. Pandey, L.D. Joshi, N.N. Misra, S.P. Dabral, D.P. Agrawal, K.P. Nautiyal, M.P. Joshi, S. Pathak, Girija Pande and Y. Mathpal. Today there is considerable literature on the history, culture and archaeology of Uttaranchal. In recent years the Department of History and Archaeology of HNB Garhwal University has contributed by undertaking excavations at some important sites in Uttaranchal. Agrawal and the author have also initiated wider studies on the Himalayan Archaeology and traditional knowledge systems in Uttaranchal. We had published a review of our work in Kumaun in 1998 (Agrawal and Kharakwal 1998). The present essay attempts to give an updated review of the archaeology of Kumaun.

The Kumaun-Garhwal Himalaya (28° 44' to 31° 25' N; 77° 45' to 81° 1' E) is endowed with famous shrines, scenic beauty, variegated flora and fauna and rich folklore. The study area is spread over 51,125 sq. km, out of which 7,632 sq km is covered by snow and 48,830 sq km by mountains.

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Geographically this region has four major divisions, extending from south to north, i.e., Terai-Bhabar, Sivaliks, Middle or Lesser or Sub-Himalayan zone and Higher Himalayan zone. The Higher Himalayan zone is highly rugged and a major part of it remains covered by snow round the year. The Sub-Himalayan zone is largely composed of crystalline, granites, gneisses and schist and dolomite rocks. This beautiful mountainous area supports temperate forests predominated by *Pinus roxburghii*, *Quercus incana*, *Quercus himalayansis*, *Cedrus deodara*, *Rhododendron arborium* and a large variety of fruit trees e.g., Mehal (*Pyrus pashio*), Makhoie (*Solanica nigrum*), Kaphal (*Myrica nagi*), Timla (*Ficus roxburghii*), Kilmora (*Berbus asiatica*) and so on. The fauna of this region is as varied as its flora. A number of wild animals dwell in these forests including leopard (*Panthera pardus*), deer, sambhar (*Cervus unicolor*), bharal and other mammalian species (Atkinson 1989). The Sivalik hills are generally covered by dense forests and rarely rise up to 1200 m whereas the Terai-Bhawar region is largely composed of debris brought down from mountains by the Himalayan rivers. All the major perennial rivers of this Himalayan area such as the Alaknanda, the Tons, the Bhagirathi, the Western Ramganga, the Koshi and the Kali are flanked generally by two and rarely by three fold alluvial terrace system. These fertile terraces were the main centers of human activity in these hills. As Uttaranchal is located in the central part of the entire Himalayan belt I have frequently used the terms Central Himalaya or Kumaun Himalaya in the text, which denote the same area.



Fig. 1. Location map of Kumaun

Let us now have a look at the archaeological evidence right from the Stone Age.

Stone Age

Das (1961-62: 103) reported a few rolled early stone tools from Kalsi near Dehradun. A few years later the Department of History and Archaeology of HNB Garhwal University also reported stone tools from Srinagar and Dang, both located in the Alakhnanda valley (Nautiyal *et al.* 1982). This assemblage includes a variety of scrapers and a fan-shaped convex edged artifact with tang, which looks like a scraper. They claim that these tools show a close resemblance to the Late Sohan industry and to the tools from Sirsa and Sohan basin in Himanchal Pradesh, discovered earlier by Y.D. Sharma. Recently, Mathpal (1987) also reported choppers and flakes from the Western Ramganga valley. Some of his illustrations look like cleavers. All these reported tools are made on quartzite and sandstone. These reports, though cursory, are very encouraging to look for tools in stratified deposits associated with some fossils and factory sites. I also collected a few possible artifacts from the valleys of Western Ramganga and Koshi and some microliths from painted rock shelters and from Lukhani in Lohaghat. These were also examined by Prof. V.N. Misra and none of them qualified to be actual tools.

Rock Art

A few rock art sites are known from Uttaranchal, which have been assigned to Prehistoric Period (Agrawal and Joshi 1978; Nautiyal and Khanduri 1986). Though rock shelters have been discovered both in Kumaun and Garhwal regions, their concentration has been found close to the north and north-east of Almora town (29°37' N; 79°38' E, between 1,300 and 1,900 m AMSL) in Kumaun. The entire area comprises a series of ridges and steep mountain slopes descending from Kasardevi and Binsar. The Binsar mountain range is covered by dense vegetation, which is dominated by *Quercus incana*, *Rhododendron* and coniferous trees of the Lesser Himalayan zone; however, the lower slopes are populated all along by *Pinus roxburghii*. In these hills, mostly on the northern slopes, we find some species of wild fruits like kafal (*Myrica nagi*), kilmora (*Berbers asiatica*), and makhoie (*Solanica nigrum*). Standing on the Kasardevi and Binsar hills, one gets a panoramic view of the countryside around and a stunning spectacle of the Himalaya ranges. For this reason the locality of Binsar attracts a large number of

tourists and it is being developed as a sanctuary. One of the tributaries of Suyal, locally known as That gad or Binsar gad, drains the entire area. This area is composed of mica-granites, schist, gneiss, sandstone, quartzite, chlorite schist and slate and phyllite rocks belonging to the Almora Nappe, which is delimited by the North and South Almora Thrusts (Valdiya 1980: 94). The outcrops also have lenses of meta-quartz. The original colour of the slate rock is grey to medium grey to light grey. Most of the rock shelters of the area seem to have been formed by the enlargement of cavities through weathering.

The credit of discovering prehistoric painting from this region goes to Agrawal and Joshi (1978). They reported such paintings from Dalband, which is located 18 km north-east of Almora town on the right bank of the Binsar gad. The shelter is locally known as Lakhiudyar, and it is perhaps the biggest one so far known in this region. A few years later more painted shelter were discovered both from Garhwal and Kumaun region (Mathpal 1987; Saklani 1983: 217). The painted shelter from Garhwal was found on the right bank of Alaknanda about 8 km north-west of Chamoli in Garhwal at an altitude of 2,000 m AMSL (Saklani 1983: 217). It is about 10 m high and overlooks a deep valley towards the north-east. Human and animal figures are shown in stylized form and their posture indicates movement. As many as eighteen human and seven animal figures are depicted in this shelter in red colour. Among these two human figures are shown comparatively bigger in size. The animals look like stag and fox with long necks. Though no weapons are shown, the human figures appear as if they are out for hunting. Another evidence of paintings have been reported from Kimni village on the Gwaldam-Almora road in Chamoli district. In this shelter a dagger-like object, some animals and reptiles are depicted in white colour. Considering their style and an absence of metallic tools Nautiyal and Khanduri (1986: 82-83) assign these paintings to the prehistoric period. Recently the PAHAR team of Nainital has also located a painting near Purola (Girija Pandey personal communication).

The main painted shelters are known as Lakhiuydar (LKDR), Likhudyar (LIKDR), Kafarkot (KFKT), Kasardevi (KDVI) and Falseema. There are several shelters at each site and they have been numbered with main site name i.e. LKDR1, LKDR 2 and so on. To find out the interrelationship, stratigraphy and chronology of these paintings, we have developed this standard nomenclature to make the study more convenient (for details see Agrawal and Kharakwal 1998; Kharakwal 1993a). In order to develop better understanding of this regional art style, besides chronostratigraphy, a total of 170 figures were copied. While tracing the paintings Munsell colour chart was also used to compare the tone of the colour. I have classified them under six major categories: 1. Male human figures; 2. Female human figures; 3. Child human figures; 4. Motifs; 5. Colour patches; and 6. Animal figures. The figure size in the Kumauni rock art is very small. The largest figure is represented by a set of small lines underlined by an eighty centimeter long line in the shelter LIKDR 1. The female figures have been shown either bulky compared to their male partners or in some cases with prominent breasts e.g., at Kafarkot (KFKT 1). Sometimes they are shown wearing head-dress or gown like cloth. Children are shown in small size (less than 4 cm in height) and sometimes on shoulders of male and female figures.



Fig. 2. Dancing scene in Lakhiudyar shelter

Themes: Prehistoric paintings generally represent large animals and humans in naturalistic form in the caves and semi-open rock shelters. However, hunting scenes are more common in the Mesolithic period. In Kumauni rock art we do not find a wide range of themes. The Human and other figures appear to have been executed with equal skill in micrographic form in stick-like and symbolic style. The artists were perhaps interested more in drawing dancing figures (fig. 2), decorative motifs, geometric and some scenes. A total of 577 human figures (ranging from 4 to 25cm in height) were counted in all the shelters. Out of these, fourteen were identified as female figures and thirty four as children. The paintings are dominated by human figures in different styles i.e., stick-like, partially

abstract, symbolic and so on. They are involved in various social activities such as dancing, jumping, running, carrying objects, holding stick-like or small round objects, and sometimes depicted in rows or in groups. In shelter LKDR 1 a human is shown in a supine posture and two other persons are shown both near its head and feet. At another place, four people are carrying an unidentified object on their shoulders possibly approaching the supine human figure. Sometimes human figures form part of a larger scene. For example in KFKT 1 several human figures are depicted in separate compartment-like conical structures joined with each other. Most of the paintings were executed in red colour (dusky, crimson, vermillion or brick red) while a few were found in black. A few animal figures e.g., jackal, goat, horse, lizard, snake and deer like animals were identified. There are no regular hunting scenes as such, though in LKDR 1 at least four scenes appear to depict hunting (see for detail Agrawal and Kharakwal 1998, Kharakwal 1993a, 2002b). The absence of domestic animals indicates that these paintings belong to the prehistoric phase. Some of the paintings appear to be decorative motifs e.g., semicircular, wavy zigzag set of lines in LKDR 1, a half-diamond structure and the zig-zag lines in LKDR 2 and a similar structure in the Falseema shelter. Flowers are also depicted in several shelters. There are 76 dot like motifs on the ceiling of LKDR 1, which may also have a decorative purpose. The paintings are generally made in monochrome, but in LIKDR 1, four dark red tree-like figures were outlined by white, perhaps added at a later stage.

Chronology: The painted shelters of Kumaun are mostly open and rarely semi-open, which bears a close similarity to the other Indian rock art sites. To depict human figures in abstract, stick-like, arrow-like and stylized motifs were employed. The abstract and arrow-like motifs were common to all the sites. Stick-like human figures were mainly executed in the second stage whereas arrow-like and stylized figures were frequently made in other stages too. A group of dancers at LKDR 1 appears quite similar to a group of dancers at Bhimbetka (Mathpal 1984: fig. 36) and at Fatehpur Sikri (Bajpai 1975), which have been assigned to the beginning of the Historical phase. The Central Indian decorative motifs were found in all the phases. The figures have generally been depicted in a very small size, almost diminutive. Taking into account the subject matter, style, superimposition, colour and state of preservation, as many as five layers of paintings were identified. Except shelters LIKDR 1, LKDR 1, LKDR 2 and KFKT 1, all others generally bear two or three strata of paintings. First phase comprises black and ochre red figures including animals, human figures and a few other motifs. Phase two covers a large number of figures in crimson red, which include several decorative motifs, as well as dancing, running and walking human figures. In the third phase, a few human figures were executed in vermilion red. However the brick-red paintings represent the fourth phase including a large number of human figures. The white pigment represents the fifth or the last phase of paintings which is found only in two shelters, i.e., LIKDR 1 and LKDR 2. I must however, emphasize that colour can never be a safe criteria for determining the chronology of paintings; though it may be useful in finalizing the sequence.

Several layers of paintings suggest a long time span of occupation in these shelters. In the central part of the shelter LKDR 1, a few Brahmi letters were found (in brick red) superimposed on dark red paintings, suggesting that we can safely assign these paintings earlier than the early centuries of the Christian era. Some of the paintings, for example, dancing scenes, the style of animal and human representations seem to resemble the paintings of the transitional phase in the Central Indian rock art. Since there are no domesticated animals, nor any figures like horse-riders, soldiers, metal weapons or anything which suggest agricultural activity or historical scenes, the paintings may be pre-Neolithic.

Though pigments made of organic material like blood, honey, wax and so on can be dated, unfortunately no attempt has been done in this direction. We did some random sampling of different painting styles both for dating and to identify the composition of pigments with the help of chemical analysis. For such analysis microgram or nanogram quantity is enough and we collected samples from Kumaun without destroying the paintings. Unfortunately we could not obtain any date but chemical analysis of pigments from Lakhiudyar (LKDR-I) revealed 5.73 ppm iron and 12.1 ppm cobalt. Another sample of red pigment from the same shelter provided 320 iron and 13.4 ppm cobalt. This indicates that the source of ochre must have been different for these samples (Agrawal and Kharakwal 1994, 1998).

Engravings:

The cupules, generally termed as cup-marks, have been found from various parts of the world. In fact dating cup like marks or cupules and other petroglyphs has remained an intractable problem. Most of the petroglyphs of Western Europe and Great Britain have been ascribed to an astro-archaeological significance (Steinberg and Lanteigne 1992). In California the Key Stone petroglyphs are associated with fertility rocks, upon which Pomo couples wished for children (Parkman 1989: 70). The ethnographic parallels in Kenya indicate Kenyan cup-marks may have been related to a local game called *bao* Dubelaar may be close to the mark in saying, "Petroglyphs are more than products of playful pastime, considering the time, energy, inventories, artistic skill, etc., which they required and inaccessible spots where they are located" (Kharakwal 1992: 30).

A variety of engravings, small circular depressions (termed as cupules) have also been found on rock exposures or in rock shelters. Henwood (1856) and Carnac (1877) had earlier recorded engravings on rocks from Devidhura in Pithoragarh and Chandeshwar (Dwarahat) in Almora district respectively in the 19th century. There are several considerably deep conical depressions on rocks besides cupules at both sites. In the eighties and nineties of the last century over two dozen such sites have been found in this region (Joshi 1986-87; Mathpal 1992; Kharakwal 1993a; Kharakwal and Rane 1997). Hundreds of cupules have been reported from these sites, which are generally less than four cm deep and 2 to 6 cm in diameter. However, only twenty engravings or petroglyphs have been found, which include bull, squarish object, footprints, straight and wavy lines, unidentified figures, tridents, conch shell script like engravings and so on. Often cupules were dug out or bruised in single or multiple lines forming bands (fig. 3). These cupules are identical to the ones found from rock shelters of Stone Age in central India (Bednarik *et al.* 1991) and to the ones associated with the Megalithic burials in Vidarbha and northern Karnataka regions (Rao 1989). But in the case of Kumaun, the so called menhirs are not associated with any burial site. Only Kaphara near Dwarahat has a few cupules, which appears to be more like a memorial stone (Kharakwal 1993b). We do not know the purpose of the making of such cupules and engravings. More than four hundred cupules have been examined but none had any chisel or cut marks. Perhaps they were made by pastoral groups long before the introduction of metal in these hills.

In Maharashtra cupules were associated with the *gaychole* game (Kharakwal and Rane 1997) like some other parts of the world. Perhaps the Kumauni cupules were also associated with some kind of game(s), as the squarish patterns of Devidhura and parallel or linear arrangements at Chandeswar, Petshal and other sites suggest (Kharakwal and Rane 1997).



Fig. 3. Cupules at Mashi

Copper Hoards

We have not been able to locate any Bronze Age settlement in Kumaun, but the discovery of several Copper Hoards is quite interesting. According to a local report (*Amar Ujala* 8th May, 1986: 3), an anthropomorph which was found in a scrap dealer’s shop at Haldwani in Nainital district is similar to the ones found at various sites in the Ganga valley (Joshi 1990: 14; 1995-96: 23-31). Whether it was a local production cannot be said as we could not examine the artefact. Nonetheless it is a significant discovery of the remains of Copper Hoard Culture in the foothills of the Kumaun Himalaya. Another hoard, comprising eight anthropomorphs, was discovered at Bankot (79º52' E; 29º45' N) in Pithoragarh while digging a dolomite (magnesite) stone quarry, close to the Inter College in 1989 by local villagers (*IAR* 1988-89: 87). Bankot village is located about 91 km east of Almora town in Pithoragarh district. The artefacts were placed one over the other in a tray like stone slab, according to the villagers who discovered them. They have an oval shaped head and their arms are spread horizontally across the body. The lower part of the body, however, is almost flat, slightly widening near the feet. There is a concave depression between the feet. The edges are generally thick and roundish, but in one case

both the arms are broken. Typologically these anthropomophs appear to be local in character. They were no doubt buried intentionally, but the reason behind this is unknown. One of these objects is now housed in the Govind Ballabh Pant Museum, Almora. The ancient mining and smelting sites of copper at Kharahi and Rai-Agar are located close to Bankot. Therefore in all likelihood it is possible that these artefacts may have been made at one of these places. There are a few other copper mines e.g., Sira in Gangoli area and Chinaka-Kali Billar and Khemkhet in eastern Kumaun.

The weight of these anthropomorphs varies from 2.5 to 3.5 kg and they contain 98% copper, 1.22% iron and a minor impurity of arsenic (Pant 1991: 41). Our close examination of these artefacts revealed that they were made in an open, single mould, probably made of stone as their measurements show some uniformity in the finishing as well. These were perhaps manufactured by direct melting of copper ore and other being poured into an open mould. Iron and arsenic remain as an impurity of the ore. Their obverse side shows some gas cavities, which suggest that they were made in an open mould, and left unfinished. On the whole they look crude and primitive with their short arms, compared to the typical specimens of the Doab. Considering their weight, morphology and surface treatment they appear to be ingots rather than any regular artefact (Agrawal 1999; Agrawal and Kharakwal 1998).

A few years back another hoard of five anthropomorphs was discovered from Khuna-Tok in Nainipatal village of Munakot block in Pithoragarh district (*Amar Ujala* 10th October, 1999). These objects were found buried in an earthen jar. Unfortunately no details of the jar are available. Their arms are incurved, longer than usual and much thinner at the end. The legs are very short. These artefacts were made by hammering a copper sheet. The vertical cross section is almost rectangular. The head does not show any thickening (Agrawal and Kharakwal 2003: chapter 4). On the whole, all these anthropomorphs appear to be quite simple and crude compared to the sophisticated examples of the Ganga Valley. Hence, considering the availability of copper ore and simplicity of the artefacts, these anthropomorphs are perhaps proto-types of the Ganga Valley ones (Gupta 1963).

The problem of the Copper Hoards Culture is quite challenging as most of them are accidental finds and there are only a few sites e.g., Saipai and Madarpur, which have yielded such objects with regular habitation deposit. Yule (1985) has done excellent documentation and study of the Copper Hoards. Agrawal (1999) has pointed out that the authors of Copper Hoard mostly used arsenical copper, the nearest source of which was Central Himalayas. In fact the percentage of arsenic varies from 1 to 7% in the Ganga Valley objects and he has stated that there is a remote possibility of deliberate addition of arsenic to the metal since arsenical copper is rarely available in north India. Since mining and metallurgy had a long tradition in Kumaun region and arsenical copper was available there, there is a good possibility that copper was supplied from Kumaun to the Ganga Valley.

Iron Age

Several Iron Age sites have been found in Uttaranchal, which include the remains of Painted Grey Ware (PGW), Megalthic and Northern Black Polished Ware (NBPW) cultures. Barring Thapli and Purola, all other PGW sites are located in the Terai region whereas cist burials (Megalithic sites) are mostly in the Lesser or Middle Himalayan area. So far only three PGW sites namely Thapli (Nautiyal *et al.* 1978-79) and Purola (Nautiyal *et al.* 1989) both in Garhwal and Kashipur in Nainital (Kumaun) (*IAR* 1965-66: 53-54) have been excavated. These PGW settlements were very small and Nautiyal has, on the basis of cultural material, assigned them to early first millennium BC, though radiocarbon dates place them in the second half of the first millennium BC. Further studies carried out by the experts of Garhwal University on these burials and Iron Age in Central Himalaya has been included in the following pages.

Burials

Several burial sites are known from Uttaranchal. Dabral (1968: 223-35) and Agrawal *et al.* (1991: 60) had noticed a few burials at Malari (30°41’ N; 79°55’ E) in Chamoli district in late sixties of the last century. In one of the exposed burials, Dabral found that the dead body was inhumated in a crouching posture and a few Red Ware earthen pots were placed near the head. Besides humans, burials were also made for animals like horses. Bronze utensils were also reported from these graves and Dabral associated them with the Sakas. In the eighties a small scale excavation conducted

by the Department of Archaeology of Garhwal University confirmed existence of cave burials (Bhatt and Nautiyal 1987-88; Nautiyal and Khanduri 1986). Some of them were interconnected. They found spouted pots, which bear vertical and horizontal grooved lines forming geometric patterns all along the body and also on the oval handle. Mathpal (1986) also reported stone lined burials from the Western Ramganga valley in Almora district. In 1990 we (with Agrawal) discovered a cist burial complex at Ganai-Chaukhutia (Agrawal *et al.* 1991).

With this background, I carried out extensive explorations between 1990 and 94 to locate more burial sites in Kumaun particularly in the valleys of the Koshi, Western Ramganga and its tributaries and Gomati all located in Almora district. In the course of explorations several new cists were found at Bechandhar (Ganai-Chaukhutia) in the valley of Kaurav Gad, a tributary of the Western Ramganga, at Gagrigol and Bhilkot (Ladyura) in the valley of the Gomati (fig. 4) (Agrawal *et al.*1992; Kharakwal 1992; Kharakwal and Harbola 1996; Kharakwal *et al.* 1993a). In Western Ramganga, burials were found on the alluvial terraces whereas in the valley of Gomati they were located on gentle slopes of the hills. These burials were made of locally available slabs of quartzite, dolomite, slate and phyllite and very often small stones were also used as pecking material. Like in the Swat valley they are generally oriented along the slopes of the respective hills. Unlike peninsular India, these burials are not visible on the surface and are generally found at more than 50 cm depth. In the case of the Bhilkot grave pits, they were cut down in shale rock. It appears that larger slabs (3 to 10 cm thick) were preferred to prepare a rectangular chamber or box like structure, but smaller slabs were also used when bigger ones were not available. Therefore often several slabs were used for making a chamber. Most of the burials appear to be secondary in nature. In few cases stone slab was also found at the base, on which the dead body and offerings like food or water in earthen pots may have been placed. We do not know the reasons behind it for them to place stone slabs at the base. Most of the reported burials were partially exposed in the sections or sometimes broken, which allowed us to collect jutting out pottery and other remains for further analysis without disturbing them.

At Bechandhar, Ganai-Chaukhutia in the Western Ramganga valley half a dozen cist burials were found on the exposed section of a terrace. Their length ranges from 60 to 127 cm, width varies from 42 to 57 cm and height 25 to 65 cm. One of the burials at Koorman was found underlying the Early Historic habitation deposit. This kind of evidence was very important for us to assign a respectable antiquity to these burials. In case of Ladyura (Ghangli) and Gagrigol the cists were found varying between 130 to 184 cm in length, 49 to 88 cm in width and 40 to 50 cm in height. Though we found only three burials in an exposed section at Bhilkot (Ladyura), the villagers, however, recollected that several cists were dug and destroyed while the local road was under construction. They also informed that very often such cists are also found while digging foundations for houses in this village. We could examine a large number of strong and thick slabs of the Himalayan schist belonging to burials, which villagers had reused in their houses. At Gagrigol seven burials were found in an exposed section. Besides these, similar cists also exist in the valley of Koshi and Mansari Nala, a tributary of the Koshi.

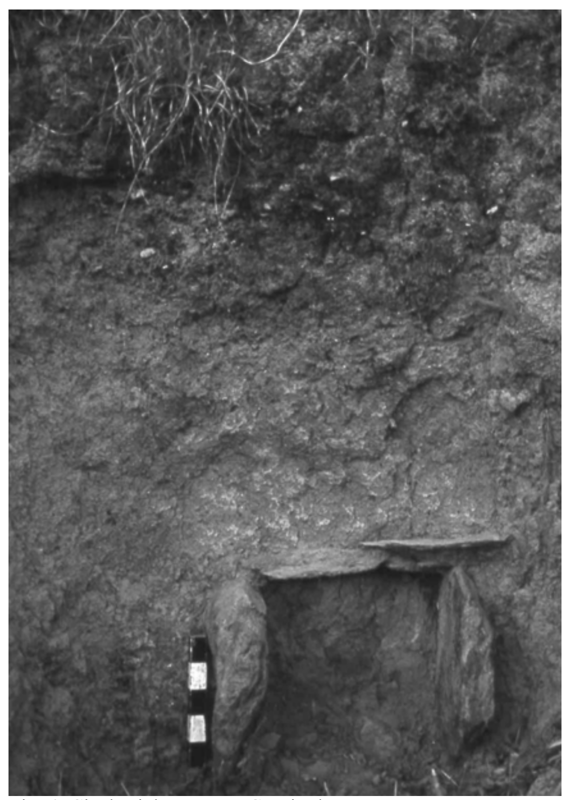


Fig. 4. Cist burial at Purara-Gagrigol

Ladyura: Ladyura is situated about 5 km north of Baijnath in the fertile valley of the Ghangli, a tributary of the Gomati in Bageshwar district (figs. 5, 6). Following our discoveries (Agrawal *et al.* 1991), a team led by A.K. Sharma and S.B. Ota of the Archaeological Survey of India excavated two cists at Ladyura in June 1991 in order to study the typology of Megaliths and delineate the plan of the cists. The Bhilkot cists, oriented north-south, were erected inside grave pits cut into the shale bed rock and varied in size. For the cist no 2 the U-shaped grave pit was 80 cm deep, 190 cm long, 80 cm wide at the top and 55 cm wide at the bottom. The cist measured 184 cm in length, 53 cm in width and 45 cm in height and was filled in with the same soil obtained by cutting the pit. Initially, the rectangular cist of the upright stone slabs was perhaps covered with more than one capstone. The space between the upright ends was packed with stone chips. Generally, the capstone of the burials is bigger and projects on all sides across the top edges of the orthostats. Two post-holes (measuring 16 and 13 cm in diameter in layer 3), were made almost equidistant from the upright orthostats of their respective sides, one on the north-western end and the other on the south-eastern end of the cist. Perhaps there were two more similar post holes, one on the south-western and another on the north-eastern end of the cist. These post-holes indicate that some kind of superstructure may have been made over the burial (Sharma 1991: 77). This appears to be a unique feature of cist burials in this region, which of course has to be confirmed by excavating more burials. A few soil samples from burials of Ganai-Chaukhutia and Gagrigol were examined by M.D. Kajale at Deccan College and identified plant remains (see detail in the following pages).

Several Grey Ware pots were collected from these burials which include a *handi*, different kinds of bowls, *lota* type pots and a medium size high necked jar. Among these the pedestalled type bowl is quite interesting, which has parallels in Swat and further west-ward dating back to the second millennium BC (fig. 7). Fragments of globular pots of gritty Red Ware with bands of incised decoration on the exterior were found from the burial horizon at Ladyura (fig. 8). This pottery is ill fired and looks identical to Malari. At least two fragments of the same ware appear to be Cord Impressed.

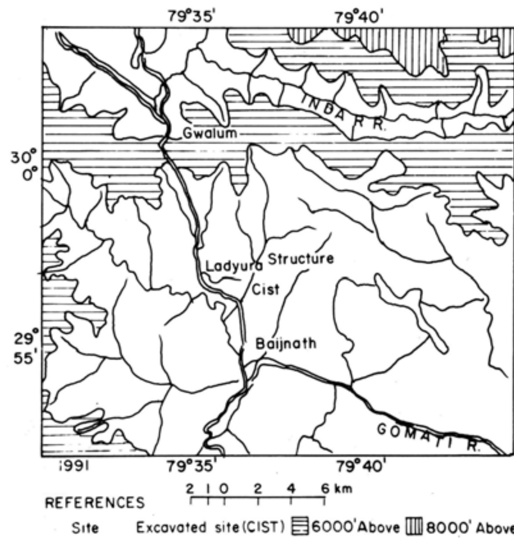


Fig. 5. Location Map of Ladyura

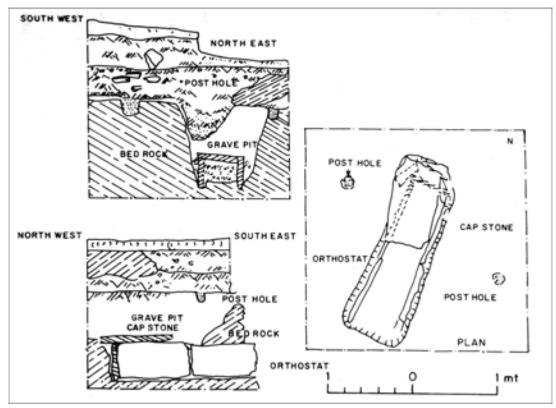


Fig. 6. Plan of cist burial at Ladyura (Courtesy ASI)

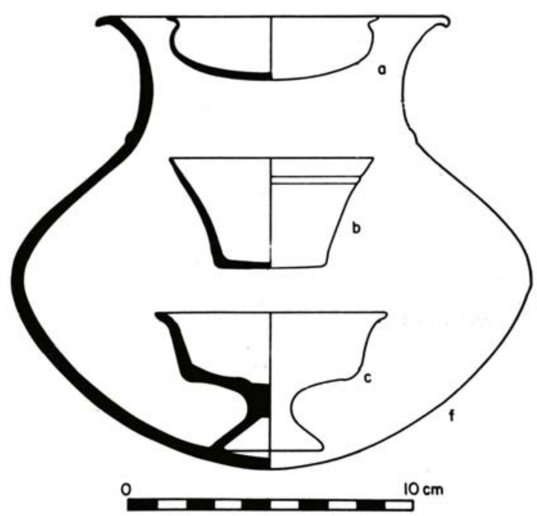


Fig. 7. Pottery from cist burials of Kumaun

The Department of History and Archaeology, HNB Garhwal University also excavated some of these burials at Sanana and Baseri, located near Masi (Khanduri *et al.* 1998-99). They found dolmenoid cists and urn type burials, which were rectangular on plan and oriented east-west. Their size varies from 128 x 40 cm to 232 x 58 cm. The urn burials at Baseri were found separated from the twin cist chambers by a wall running north-south. Another burial was protected by a dressed stone wall. Perhaps these two types of burials, according to the excavators, belonged to two different groups of people. It is also possible that they are an indicator of social stratification. The cist burials were also found oriented in a north-south direction. Also discovered were around two dozen bowls, dishes, jars and miniature bowls of grey and red ware and a large sized hand made jars. These pots were placed on a stone slab in the burials. Some of these pots contain painted designs similar to the PGW pottery. Disarticulated human bones including skull, femur, fibula, jaw, tooth and other bone fragments were found in the burials. It seems that the body was first excarnated and then leftover bones were subsequently placed in the burials. This assumption has also been supported by the identification of phosphorous rich soil in the burials (Farswan and Nautiyal 1997). These are therefore secondary kind of burials.

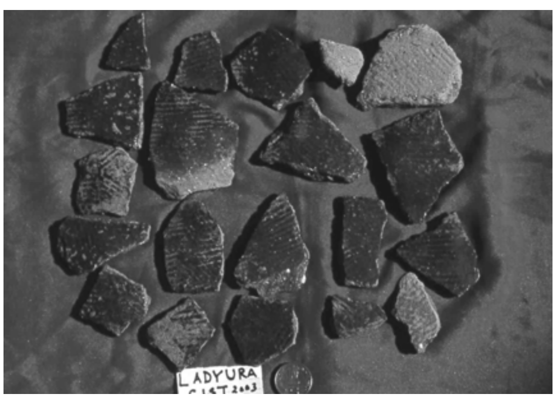


Fig. 8. Incised Red Ware from Ladyura (Photo by Osada)

Apart from bones and pottery only a few iron objects like pins, a nail and fragment of a sickle were found from these burials. The ceramic assemblage was represented by the Red and Grey Ware, but the latter was predominant. Several Grey Ware bowls, dishes, jars and a wide mouthed hand made jar were found from these graves. The pottery was sometimes decorated with vertical, horizontal and slanting strokes and in some cases with a black band on rim. The pottery shapes in general, according to the excavators, show typological similarity to the PGW culture material from Hastinapur, Ahichchhtra, Jakhera and Thapli. Here it is pertinent to note that there is an iron smelting site at Uleni close to this burial complex dating back to 1st millennium BC.

In the present state of our knowledge, the Kumauni burials may be categorized into the following types: 1. Cists with a single capstone, 2. Cists with more than one capstone, 3. Twin cist chambers, 4. Cists with slabs at the bottom, 5. Burials that are protected from all the sides, by a wall of dressed stones, and 6. Urn burials. Sometimes there is a hybrid form combining two or more types, thus giving rise to a new type e.g., 1 and 4.

Some pottery shapes of the Kumauni graves like the convex sided bowl, pedestalled cups and high necked globular jar have parallels in the Kherai graves of Swat, Pakistan (Stacul 1987). Besides the pottery, the selection of location of the grave also bears a striking similarity to that of Swat. In both areas the burials are located on the river terraces (sometimes near the confluence or on one or both sides of a river) and quite close to the hill slopes. The Kumauni cists are buried at a depth ranging from 40 to 150 cm and are typologically quite close to the Kherai and Ghaligai graves of phase I, II and III covering a time span of *c.* 2400- 1500 BC (Agrawal and Kharakwal 1998: 110-113; Kharakwal 1993a; Kharakwal and Harbola 1996; Stacul 1987). On the basis of similarity of pottery shapes and burial typology, the Kumaun burials may be of a slightly later date than those of the Swat (Kherai), thus giving us a tentative date between second millennium BC and the beginning of first millennium BC. It may therefore be stated that the authors of these burials were perhaps the first people to use iron in Kumaun sometime in the early first millennium BC, if not earlier.

These graves are neither large nor elaborate and technologically complex like the peninsular Indian Megalithic cists. Moreover, the characteristic Black-and-Red ware pottery belonging to the Megalithic culture is also absent here. Therefore these graves are not Megalithic cists in the strict sense. On the other hand, some shapes particularly from Sanana and Baseri have been stated to be identical to the PGW assemblage of the Ganga Valley. Hence, perhaps their authors represent a transitional stage between the Coarse Grey Wares of the north-west and the PGW of the Ganga Doab

(Agrawal and Kharakwal 1998: 110-113). It is important to note here that the filling of one of the burials at Purara-Gagrigol has given a calibrated radiocarbon date PRL 1592 2666-2526 BC. It is quite likely that the tradition of burial making had begun in Uttaranchal in early third millennium BC like at Swat and continued for fifteen hundred years or even more. We will have to obtain more dates to support this hypothesis.

The Kumauni cist burials are secondary, perhaps, evolved from the primary ones. Since the primary burials have not been encountered so far it may be assumed that the authors of these graves entered these hills with a later style of disposal of their dead. The discovery of a horse skeleton from Malari (Nautiyal and Khanduri 1986: 88) is quite interesting, which indicates Central Asian and Chinese traits in this region. Perhaps the authors of Malari graves and rest of the Kumauni graves were the same peoples, which may have entered Kumaun via Malari. Of course we need to do more field work to confirm this view. Though earlier Dabral (1968) had assigned these burials to the Sakas, it is difficult to accept this because the Khasas were more widely distributed in these hills than any other tribe. Therefore the Khasas appear to be the more probable candidate.

Besides burials, a variety of megalithic types such as cairns, menhirs and dolmens have also been found in Kumaun. I am, however, not sure if they really belong to the Megalithic culture as none of them have been excavated. A large thick stone slab (300 x 142cm) supported by six orthostats ranging from 65 to 102 cm in height, which looks like a dolmen is located near the painted rock shelter at Petshal in Almora district. Besides these, Henwood (1856) had also noticed cairns at Devidhura. A few circular and oblong heaps of stones found at Jaskot and Odyari, look like cairns. No other cultural material was found with them, hence their antiquity is doubtful. These evidences indicate the presence of the Megalithic tradition in Kumaun. I have examined a few monoliths at Gagrigol, Kaphra near Dwarahat, Deolidana, Deenapani and Devidhura. These monoliths are dressed and therefore appear to be historical ones (Kharakwal 1993b).

Ancient Mining and Smelting

The Central Himalayan area is known for its hoary metallurgical tradition. In this region copper, iron, lead and other ores were mined extensively since millennia (Atkinson 1981: 259-98). I explored several ancient mining and smelting sites and collected ore, slag and pottery for analysis. Though we do not have any Chalcolithic settlement in the deep hills, the discovery of Copper Hoards surely indicates human activity way back in the 2nd millennium BC. According to the local tradition the Agaris were engaged in ancient mining of ores and the Tamtas did copper smithy. Several ancient copper mines like Sira, Gangoli, Danpur and others were recorded by Atkinson in the last quarter of the 20th century. Our ethnographic survey revealed that place/ village names like Tamkhani (mine of copper), Tamadhaun (stone of copper), Tamtyura (place of copper smithy!), Lohakhan or Lukhani (mine of iron), Lohaghat (valley of iron), Agar are associated with archaeometallurgical sites. This local knowledge proved to be rewarding to locate several archaeometallurgy. Kharahi area in Bageshwar district is known as the traditional center of copper metallurgy, though there are mines and smelting sites of lead and iron as well. Atkinson (1980-81: 282) writes that the Gaul mine of Kharahi Patti and Sor Gurang mines produced grey copper in small quantity. Tamtyura, Danochhina, Khan-garh (Khano-ki-garh), Agar, Chaugochhina, Dewaldhar, Kharak-Tamta, Ghingarkhola, Binsar, Bhatkhola, Simsyari, Bihargaon, Uderkhani, Bilona, Sisakhani, Gair-Sikera, Lob and Borgaon were, according to the villagers, some of the places where metallurgy was practised in ancient times in Kumaun. The Agaris of Kharahi are considered to be expert miners. According to the copper smiths in Kharahi Chanauli, Joshi Palari, Uderkhani, Chaugaonchhina, Bihar-gaon, Naial and Kharak-Tamta were the first settlement of the Tamtas in Kumaun. They recollect that their ancestors immigrated to this region from Rajasthan. A few mining shafts were also found in this area (see for details Kharakwal 1993a, chapters 4 and 5).

In Kumaun, copper ores are available at Dewalthal, Chandak and Kanalichhina in Bageshwar district in the form of veins of pyrite-chalcopyrite, which occur in dolomites. Besides these, the occurrence of copper ores has also been reported from Rai-Agar and Boragar (between Seraghat and Berinag) (Pant 1988). Though the content of copper is meagre at both the places (less than 2%), there is evidence of considerable amount of slag, fragments of tuyeres and furnace at both sites. A polymetallic copper deposit is known from Askot, in which some important ores such as sphalerite, galena,

chalcopyrite and arsenopyrite occur. In this deposit Cu 2.32, Pb 2.64 and Zn 3.95 has been found (Krishnamurthy and Krishnaswamy 1986; for detail see Agrawal 1999).

Iron

The archaeological evidence of iron from the burials at Malari, Sanana and Baseri and from the smelting site at Uleni near Dwarahat goes back to the first millennium BC. At some sites like Agar near Pithorgarh and Agar near Dwarahat iron smithy was practiced as late as the sixties of the last century. The tradition of iron making was so popular in these hills that even the Britishers also attempted to set in an iron industry in Kumaun in the 19^{th} Century (1850 to 1880) (Pandey and Geijerstam 2002). They established workshops for iron production at Dechauri, Kaladhungi, Khurpa Tal, and Ramgarh. Though they were able to produce a few thousand tons of pig iron using blast furnaces, their industry could not last long perhaps due to ignorance of traditional techniques (Agrawal and Goyal 2003). There were several mines in Nainital district e.g., Lusgani, Nathuakhan, Gulla and Satbunga under operation during the British rule (Atkinson 1980-81: 287). He reports that scaly iron ore was mined at Ramgarh and Dhaniyakot on the Koshi and good quality iron was obtained from these mines. He further records that the British government had given these mines on lease to Agaris, the traditional mining experts of Kumaun, for mining work (Agrawal & Kharakwal 1998: chapter 4). Our ethnographic study reveals that considerable quantity of iron was being produced in Kumaun during the pre-industrial phase. Atkinson (1980-81: 287) reports that the iron ores found in Kumaun belong to either of the two varieties, the rhombohedral or the prismatic. The first is a peroxide of iron containing in its best defined type 70% iron and 30% oxygen.

Several iron smelting sites such as Bora-Agar (near Berinag), Asurchul, Agar and Ban-Agar (all near Pithoragarh), Lukhani (Lohaghat), Uleni, Tamakhani, Tamadhon and Agar (near Dwarahat), Lob (near Bageshwar), Chhani (near Kausani), Agar and Raul-Kudi (near Bhool Gaon) in Mansari nala (*IAR* 1998-99: 170-172), a tributary of Koshi, Hatkhet (Ranman) in the valley of Koshi, Narayankali near Almora and several others have been discovered (*IAR* 1998-99: 170-172; Kharakwal 1993a, 1999). Fragments of tuyeres and slag of different sizes were found at most of these sites. Besides these, highly burnt thick plastered pieces of clay were also found at sites like Bora-agar, Agar and Raul-Kudi, which may have been parts of furnace. The temperature inside furnaces must have been more than 1200^0C as the bigger chunks of slag bear impressions of reaching a fluid state. The Red and Grey Ware pottery was also recorded at a number of sites, which might have been used by the smiths. At Asurchul and Lukhani shallow mining shafts were also examined, which vary from two to seven meters in diameter and one to three meters in depth. Some ore samples from mines of Lukhani, Asurchul, Agar, Lob and other sites were analyzed by Dr. Gogte of Deccan College by XRD method and it was found that high grade ores (haematite, malachite and goethite) were mined in ancient times.

Uleni: Uleni (1200 m AMSL), an iron smelting site, is located about 8 km north-west of Dwarahat in Almora district in the catchment area of the Western Ramaganga. The area is rich in ferrugenous material and occasionally huge boulders containing iron ore can be seen in the seasonal nala at Uleni. Considerable amount of slag was found littered in the agricultural terraces besides a small heap. We could not locate any furnace as the whole site has been levelled for agriculture. Slag deposit along with charcoal was also found in a rock shelter nearby. The iron slag of Uleni was found to be mainly iron silicate, with no traces of copper. A charcoal sample obtained from this shelter was dated back to the first millennium BC (PRL-1648: 2770±90 BP; calibrated range - 1022 to 826 BC). The burial sites of Kumaun are located within 10 to 50 km distance from Uleni. It is, therefore, likely that iron from Uleni may have been used by the authors of burials.

I have earlier explained that the similarity between the Kumauni and the Swat valley (Stacul 1987; Tusa 1981) graves is striking. In both the areas Grey Ware and iron has been found from graves. On the other hand, the pottery of Kumauni graves has similarity with PGW material of the Ganga Valley. Besides there are PGW sites like Thapli and Purola within the Central Himalayan region. This kind of evidence together with the discovery of iron smelting sites going back to the first millennium BC surely indicates that this remote Himalayan region was not a *cul-de sac*. On the basis of this kind of evidence we have suggested elsewhere that the PGW people of the Ganga Valley obtained iron from Kumaun or Central Himalaya (Agrawal *et al.* 1995; Agrawal and

Kharakwal 1998: chapter 4; 2003: chapters 5 and 6; 2002a). Perhaps this Himalayan region played a vital role in the diffusion of metal technologies towards the Ganga valley, as also in the supply of finished iron artefacts. Now it is important to look for habitation sites of early Iron Age to develop a fuller understanding of the role of this region in diffusion of metallurgy. Nautiyal *et al.* (1991) have attempted ecological perspective to understand the development of Iron Age culture in this region.

Folk Tradition and Iron

In Kumaun the old tradition of iron metallurgy is also registered in folklore. Joshi (2003) has shown how iron technology has survived in the folklore of the Himalayan hunter god Aidi or Airi. The aforesaid archaeological evidence of the graves and early date for smelting certainly support the antiquity of the folk tradition too. Traditionally Lohaghat, in eastern Kumaun, is known for a rust-resistant iron making, using local ores. The Kumauni folklore attributes early iron technology to the *Asuras* like in Bihar and Central India (Agrawal & Kharakwal 1998; Leuva 1963). In Asur *kahani* (folk tale of Asuras) iron technology is called *Asur Vidya* (Vibha Tripathi in press). Was it a non-Aryan knowledge system? However, Parpola (1998) suggests that Indo-Aryans speaking people brought both iron and megalithic burial customs to India. It seems that Parpola's conclusion is not supported by folk tradition. In Kumauni folklore several iron smelting sites and places are attributed to the Asuras, for example, the region of Champawat and Lohaghat in eastern Kumaun, Asur-chul (hearth of the Asuras), an ancient smelting site, Banasur ka Quila, a fort near Lohaghat (Kharakwal *et al.* 2003-04) and so on. The fort of Banasur is located close to Lukhani, an iron smelting site. The ancient mines are often known as Agar (means mine/storage) and miners as Agaris. Iron is called *lu* in Kumauni and sometimes place names are also derived from *lu* e.g., Lughat or Lohaghat (valley of iron). It seems that the folklore tradition indicates a remote antiquity of iron in Kumaun, though I do not know if Agaris had any relationship with the Asuras.

Khasas

The Khasas, Darads, Tangans, Kirats and Kols are frequently referred to as the ancient inhabitants of the Himalayan region (Atkinson 1989, Sankrityayana 1958; Vaishnava 1977). Here we will only briefly discuss the Khasas and Agaris as their role appears to be important to understand early agriculture and metal technology in the Himalayan region.

The Khasas are held to be of Central Asian origin and perhaps immigrated to India through northwest like the Sakas and are scattered all over the Himalayan region i.e., Kashgar, Kashmir, Kangra, Kumaun, Kulu and Nepal (Joshi 1929; Saklani 1998). They might have been stronger than other pastoral tribes and gradually dissolved in the Himalayan society. The Khasas or Khasias still have a strong presence in the Central Himalayan region. Earlier some scholars had suggested that the words/ place names like Kassite, Kashmir, Kashgar and so on are related to them and they belong to the Kassites of Mesopotamia (Sankrityayana 1958; Vaishnava 1977). We have elsewhere suggested that the authors of Kumauni burials were the Khasas (Agrawal and Kharakwal 1998; 2003; Kharakwal *et al.* 2003-04; Nautiyal and Khanduri 1986) and they may have obtained iron from the Agaris as folklore associates Khasas with the warrier tradition rather than iron workers. It seems that the burials of Uttaranchal, Kashmir and Gandhar (Swat) are comparable (Agrawal *et al.* 1995; Dani 1967; Stacul 1987; Tusa 1981). In fact, such a (animal and human) burial tradition can be traced up to the middle reaches of the Yangtze (Yasuda 2000) and inner Mongolia also (Zhao Fangzhi 1996: 38). The burials of Uttaranchal may belong to the early Indo-European immigrants in Uttaranchal if these postulations are correct. Agrawal (1999) suggests that the Kumauni burials and the Khasas may have a relationship with the cemeteries in the Tarim basin, which belong to the Caucasians (Mair 1995). He also suggests there is a strong possibility of diffusion of iron technology from Caucasus to Kumaun via the silk route along with the Khasas in the early first millennium BC. They appear to represent a pre- Vedic society in this region. Thus the problem of introduction of iron technology in the Himalayan region needs to be addressed carefully as both the Khasas and the Agaris (Kols!) appear to be strong candidates. Nautiyal *et al.* (1991) attempted to understand the beginning of iron technology and project this region as an independent entity. But the light of aforesaid evidence and absence of different stages of development of iron technology it is difficult to support their view.

Folklore and Early Agriculture

We have yet to undertake archaeological excavations in Uttaranchal to understand the

beginning of agriculture. The study of plant remains from cist burials indicates that agriculture was known to their authors (Kharakwal 1993a appendix). A few soil samples from burials of Ganai-Chaukhutia and Gagrigol examined by M.D. Kajale at Deccan College yielded several plant remains such as *Setaria* type, *Panicum*, *Cyperaceae*, *Paspalum scrobiculatum*, *Echinochloa* (?) *Sorghum* (?), *Medicago* (?). The excavation of contemporary habitation site may allow us to develop better understanding of agriculture. Though modern subsistence is mainly based on cultivation of rice, wheat, lentils and millets [finger millet (*madua*) *Eleusine coracana*; Barnyard millet (madira) *Echinochloa frumentacea*] and cattle breeding, some agricultural rites, rituals and festivals appear to be quite important and interesting to understand the beginning of agriculture in this hilly tract. Among these, rice as a cereal and rice rituals play very important role in the cultural life of Uttaranchalis (Kharakwal *et al.* 2004).

In the Central Himalayan region various festivals, rituals and agricultural rites related to rice are prevalent. Rice has very high respect in the Himalayan society as it can be either cooked by those men who wear the sacred thread (*yajnopavita*) or only by those women who have undergone certain *Brahmanic samskaras* (rituals). Each house has a special place, slightly elevated with U-shaped hearths, to cook rice. A few rice types that are grown in the hills are sweet and sticky like *O. japonica*, which are valued by people. Regional festivals like Chyura, Mana-hatyali, Fuldyo, Hiljatra and many others are associated with rice. The new-year day, according to the Hindu calendar, is celebrated by observing the Fuldyo festival. Children of the entire village together perform symbolic worship at the entrance of each house by offering rice grains and flowers and by singing the following lines:

Phool dei Chhamma dei
Daino dwar bhariye rai jo bhakar
Teri dei sau sau namaskar.

In these lines they pray and wish, "may this house remain full of grains and prosperous always". The house owner then gives jaggery or sweets and rice grains to all the children. This festival suggests that rice symbolizes prosperity. While celebrating the Hiljatra festival in Eastern Kumaun at Pithoragarh symbolic rice plantation and associated agricultural activities and ritual are performed. The festival begins with the symbolic creation of the earth. Perhaps this festival suggests remote beginning of rice cultivation in this area. Goats also are sacrificed during the festival. It may be recalled here that animal sacrifice is common to all the early rice growing areas in Asia. It is believed that this festival was adopted from Nepal, which may be a clue to for introduction of rice from the Himalayan corridors. While observing the Mana-Hatyali festival, semi-liquid rice paste is applied to everyone and also to animals, wishing good health throughout the year. Intact grains of rice are used by Shamans (*Jagarias* or *Dangarias)* to get rid of evil spirits, as in South East Asia, to find lost persons, and to narrate past and predict future events. Rice deity is worshipped before wet transplantation (fig. 9) and once the harvesting is over. *Chyura* (roasted and pounded rice) is prepared only from dry cultivated rice and are sent to each member of the family as blessings. This Himalayan festival has a striking similarity with the festival of Ganga valley and East Asia (Kharakwal *et al.* 2004). This kind of similarity perhaps suggests a relationship of MonKhmer or proto-Mundas with the Himalayan region. Rice is believed to be the best (*sarvasrestha*) among seven main staple grains. According to Hindu mythology, the intact grain on the forehead symbolizes the supremacy of rice over all other cereals. There are several other rituals and agricultural rites connected with rice e.g., a few rice grains are tied on the waist of a Hindu girl when proceeding to her husband's house after marriage for the first time. In Uttaranchal, so also in other parts of the country, the newly married Hindu woman is asked to tumble a utensil full of rice in order to spread in the house or dip her hands in the semi-liquid rice paste and apply it to the entrance while entering her husband's house for the first time. Both these customs symbolize that she is bringing prosperity to the family or home.

A variety of rituals and festivals and agricultural rites, associated with rice, are prevalent in early rice-growing regions of Asia (Central Himalaya, Ganga valley, northeastern India, South East Asia, China and Japan) and some of them do have striking similarity with each other. For example, rice is believed to have a soul, it symbolises prosperity, beauty, fertility, well-being and eternity. The myths of the origin of rice in such distant regions also have striking similarity, indicating some interlinks. To obtain better crops, animal sacrifice is common to all the regions. Rice

is held in high esteem in all the early rice-growing regions as it can be cooked only by authorized people of the village (in Central Himalaya), used for curing people and it is worshipped before transplantation and after harvesting. It is the only grain applied on the forehead of the deities as well as humans, which indicates its supremacy over other cereals. No other cereal is venerated in the society, perhaps because it was the first cultivated cereal, which provided prosperity and eventually became part of rituals. It seems that such strong rituals indicate the remote antiquity of rice in Central Himalaya.



Fig. 9. Worshipping of rice plants or deity! Before wet plantation (Ropai)

Recent studies in the middle reaches of the Yangtze in China have shown that the cultivation of *O. japonica* variety of rice had begun more than 10,000 years BP (Yasuda 2002), though the origin of *indica* is still a mystery. The early rice growing communities of China, Japan, South East Asia and India were using Cord Impressed pottery (Kharakwal *et al.* 2004), which indicate some sort of loose connection among these different regions. Linguistic studies indicate that rice cultivation spread from the homeland of the Austric people in China to South East Asia and India along with the proto Austro-Asiatic (Proto-MonKhmer) (Bayard 1996; Blust 1996; Osada 1995; White 1997). Munda and MonKhmer language groups are two branches of the Austro-Asiatic family (Osada 1992). Grierson (1967-1968) has identified some residue of MonKhmer words in the Kumauni dialects. The Kols are said to be the first ethnic people of Kumaun, which had descended from the Munda speaking group. The modern Dom people of Kumaun are supposed to be representatives of the Kols (Atkinson 1980-81: 370; Sharma 1988), they are generally dark complexioned and perhaps represent the Austro-Asiatic features (Agrawal and Kharakwal 2003: chapter 6; Saklani 1998). Some of them are called Agaris and practice traditional iron smithy. In eastern India also the Kol tribe was largely involved in pre-industrial iron working (Chakrabarti 1992). Perhaps these Agaris, belonging to Kols, contributed both to diffusion of iron technology and agriculture in Kumaun (Agrawal & Kharakwal 1998, 2003).

Cup- marks and Ukhals and Medicinal Technology

A large number of cup like pits (176), conical pits (208) and a few large pear shaped pits were found on rocks over two dozen sites (e.g., Sikhar, Gagrigol, Suraikhet, Jalali, Mashi, Dwarahat, Petshal, Jasktot and so on) in Uttaranchal (Agrawal and Kharakwal 1998; Joshi 1986-87; Kharakwal 1993a). Majority of such pits were found on rock exposures located on the ridges and gentle slope of the hills and none of them was found close to a river or water body. In my dissertation and earlier publications I had described different types of circular pits including cupules under a blanket term cup-marks associated with rock art or Megalithic culture. The nuclear zone of such cup marks and pits appears to be the catchment area of the Gagas and Suyal rivers in Almora district. These pits are mostly dug in hard rocks and their diameters vary from 7 to 45cm and depths vary from 6 to 43 cm. The base of these cup-marks or pits is either V or U shaped. They are identical to the modern Kumauni *ukhals*, which are found in every house and used for pounding rice grains in order to separate husk. Both cup-marks and conical pits were obviously dug out by sharp metal tools as chisel marks were noticed on the inner walls at several sites e.g., at Suraikhet, Pershal, Dwarahat. The inner wall of most of these pits is polished, which indicates that they were certainly used for grinding purpose. Our close examination of modern Kumauni *ukhals* revealed that initially ukhals are made V shaped, but after long use for pounding their base gradually expands and many become U shaped. It may be stated that the U shaped pits at all the reported sites in Kumaun may have been used for pounding or grinding some edible substance for a long time.

There is strong tradition of Ayurvedic medicinal system in the Uttaranchal Himalaya as a medicine man and traditional Ayurvedic doctors (vaidyas) are usually found in almost all the villages. It is interesting to note that more than one thousand medicinal plants are known in the Himalayan area

(Agrawal *et al.* 2003-04; Gaur *et al.* 1984; Pandey *et al.* 1999; Sawant *et al.* 1998). The knowledgeable villagers at most of the cup mark sites recollect that these pits were used for preparing medicines in ancient times. A few soil samples obtained from Odyari near Koshi, Almora district, were examined by Prof. Kajale and some plant remains such as *Ipomea type, Cyperaceae type, Medicago type, Endocarp, Setaria, Polygonum* were identified. We need to look for remains of medicinal plants in these pits!

At Jaskot near Almora three large pear shaped pits with 40, 50 and 47 cm diameter and 105, 130 and 110 cm depths respectively were found besides thirty one cup like and conical pits. These pear shaped pits perhaps had lids also, as in all three cases space for lids has been cut on the rims. They may have been used for storage of medicinal plants or some substance that was pounded or ground in the conical pits around. All these pits are half filled with soil deposit and careful excavation and analysis of soil may help to understand their possible use.

Historical Phase

It seems that this mountainous region was an important cultural entity during the 2nd and 3rd century BC as the famous inscription of Ashoka is located at Kalsi in Uttarakhand. The Kushana rulers seem to have reached these hills as their coins have been discovered from various sites in Kumaun-Garhwal. Moreover several sites, e.g., Rainhat, Kashipur, Panduwala, Narayankali, Bharatmandir, Itoli, Kansyari, Bagwalipokhar, Vibhandeswar and many others have yielded Kusana type bricks and pottery. Joshi (1989, 1992) strongly argues that the Kunindas and Arjunayans jointly drove out the Kusanas from these hills. The Kuninda tribe appears to have been very powerful during the early centuries of the Christian era as a large number of copper and lead coins, issued by them, have been discovered from Uttaranchal and its adjoining regions. Their coins, on palaeographical grounds, have been dated between 2nd century BC to 3rd century AD (Joshi 1989). The Historical, Early Medieval and Late Medieval phases of Uttaranchal himalaya are characterized by the construction of a large number of Indo-Aryan style temples, Brahmanic icons, forts, varied hydraulic structures and other secular structures (Agrawal *et al.* 2003-04). The Katyuri kings ruled this region from 7th to 13th century AD, which is regarded as the golden phase of architectural activity in this region. So far only two Iron Age settlements namely Ranihat in Garhwal (Nautiyal and Khanduri 1977) and Kashipur (*IAR* 1965-66: 53-54) in Kumaun have been excavated. Recently Kumaun University has initiated excavation at Bagwalipokhar (VDS Negi personal communication), but their report is yet to appear. To develop better understanding of the beginning of metal technology and agriculture we need to undertake horizontal digging at some sites like Bibhandeshwar, Chaukhutiya and Baijnath.

Conclusion

This paper is an attempt to summarize results of my preliminary explorations in Kumaun. I have attempted to document the evidence of rock art, cist burials and archaeometallurgical sites of Kumaun for the first time. In most of the earlier publications the rock paintings of this region has been generally referred to as Prehistoric. I have been able to work out a tentative chrono-stratigraphy of the paintings and considering their subject matter and style, and it appears that they belong to a transitional phase between Prehistoric and Historic cultures. Unfortunately I could not locate any Stone Age site during my survey. In case of burials, some early scholars like Rahul Sankrityayan (1958) identified a few burials belonging to the Khasas at Dwarahat, but during our survey we did not find such burials there. S.P. Dabral (1968) associated the burials of Malari with Sakas, but his postulation has not been appreciated. Considering the strong presence of the Khasas in the folklore, I think that they were the authors of these cist burials. Of course the discovery of cist burials in the Central Himalaya has put forward several new questions to be addressed in future researches i.e. the beginning of agriculture, domestication, metal technology and so on. I have suggested that Khasas were the probable authors of these burials. Besides burials, the discovery of Copper Hoards and scores of archeometallurgical sites clearly indicate that this region was not a *cul-de-sac*, rather it was a cultural corridor between China-Central Asia and the Ganga Valley. It is likely that the Himalayan corridors played a very important role in trade and agriculture of this region. Citing Agrawal's work (1999), I have argued that the Central Himalayan region played an important role for diffusion of metal technology and in the urbanization process in the Ganga Valley.

The study of folklore helped us largely to understand iron technology and rice cultivation. The study of folklore was not only useful to locate new archaeometallurgical sites but also strongly indicates remote antiquity of rice agriculture. In fact undertaking excavations at some early habitation sites and studying lacustral deposits at Pithoragarh, Baijnath, Bagwalipokhar and Uttarkashi would help us in understanding the possible early beginning of agriculture and contemporary climate. Besides these, there are hundreds of cup like marks or conical pits rock exposures, which, according to local knowledge, are associated with the traditional medicinal system. Therefore, folklore appears to help us at various levels to understand the history in holistic perspective. Thus the above description clearly indicates that this region has great archaeological potential and it was occupied right from prehistoric times.

To me the chapterisation of my thesis appears to be quite relevant even today. I would like to include a chapter on traditional technologies and crafts if I have to revise my dissertation today. There are various traditional technologies e.g., hydraulic, distillation, wooden craft, *gharat* (grinding grains by using energy of water) and so on (Agrawal *et al*. 2003-04).

It is held that several ethnic groups like Kols, Kirats, Khasas, Sakas, Kushanas and so on arrived here at different times. It seems that all these immigrants were integrated here in course of time and contributed to the development of regional culture. Therefore, elsewhere we have written that the Central Himalayas provide a mini example for understanding the Indian civilizational processes.

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Chalcolithic Ceramics of Balathal: A Diachronic Study

Anup Mishra

Introduction

Ceramics, one of the most intimate artefacts of human beings, form a major part of the cultural materials of the Chalcolithic period. The use of ceramics in interpreting the lifestyle of the ancient people and other aspects of their culture is well known. The unique shapes, sizes, decorating patterns, manufacturing modalities and functions of ceramics reflect distinct traditions and thereby represent different ethnic groups. This paper attempts to discuss and analyse in detail the discrete nature of the Chalcolithic ceramics of Balathal and their transformation with respect to the cultural progress.

Balathal ($24^0$43' N: $73^0$59' E)

This ancient site is located in the eastern corner of the village of Balathal, in the Vallabhnagar Tehsil of Udaipur District, Rajasthan. It is situated 42km to the northeast of the city of Udaipur along the Udaipur-Chittaurgarh highway. The site which covers an area of five acres primarily thrived on a lake-like water body formed at the catchments of the *Katarnadi* river.

The site is located in Mewar in southeastern Rajasthan. The region is an extension of the *Malwa* plateau and is bounded by the Aravallis in the western side and outlines of Aravallis in the eastern side. The Indo-Gangetic plain lies on the northern side of this region. The region is divided into three physiographic divisions - (1) Aravalli Range and Bhorat Plateau, (2) Eastern Plains and (3) South-eastern Rajasthan Pathar (Hadoti Plateau) which provided an abundant supply of raw materials including minerals and semiprecious stones. The Banas River, tributary of the Chambal River, formed a wide network of water bodies in this region. Besides, the region received a fair amount of regular monsoonal and winter rainfall.

Excavations

The site was discovered by Prof. V.N. Misra in 1964 and was excavated for seven consecutive years starting from 1994 to 2000 under his supervision in a joint effort of the Department of Archaeology, Deccan College, Pune and the Institute of Rajasthan Studies, Rajasthan Vidyapeeth, Udaipur. An area excavation was carried out spreading across a larger part of the mound. A cultural deposit of about seven metres belonging to two periods—Chalcolithic (I) and Early Historic (II)—was found. A cultural break represented by a thick black sterile layer segregated the periods. The Chalcolithic culture belonged to the Ahar Culture of the region (Misra *et al*. 1995; 1997; Misra 1997; Mishra 2000; 2002-03).

Ahar Culture

A third millennium B.C. farming community having knowledge of copper technology was first brought to light at the site of Ahar, District Udaipur, Rajasthan. Hence, the culture is denominated after the name of the type-site. The site was first excavated by the State Department of Archaeology, Rajasthan, for three seasons under the supervision of R.C. Agrawala (*IAR* 1952-54). The Department of Archaeology, Deccan College, Pune conducted further excavations at this site under the direction of Prof. H.D. Sankalia in 1965 (Sankalia *et al*. 1969) and the antiquity of the Chalcolithic culture was thereby ascertained. However, prior to the excavations at Balathal and further excavations at Gilund (Shinde and Possehl in press) this culture was considered as post-Harappan and placed to fill the cultural void between the end of first urbanization and beginning of second urbanization in the subcontinent.

Above ninety sites have been discovered so far, spreading across the southeastern Rajasthan, on the banks of the major river Banas and its tributaries Berach, Kothari, Khari, Dal, Sodra and Mashi. Some of the major excavated sites are Ahar (*IAR* 1952-54; Sankalia *et al*. 1969), Gilund (*IAR* 1959), Balathal (Misra *et. al*. 1995; 1997; Misra 1997; Mishra 2000) and Ojiyana (Meena and Tripathi 2001).

The Chalcolithic Culture at Balathal

The people lived in three types of houses—stone houses, mud brick houses with stone foundations and mud houses. All the houses had thatched roofs. The stones—schist and granite—were collected from the local stone outcrops (Untala Granitic Complex). The floors of the houses were made of rubble and yellow silt and were rammed hard before being plastered with clay mixed with cow dung. Initially, the houses were single-roomed and later multiple rooms and a courtyard in the front were added. Storage pits, hearths, saddle querns and mullers were noted inside the houses. The most

significant construction of the later phase was the fortified enclosure which was located in the centre of the settlement. This enclosure covered an area of 500 sq. m, the function of which is not clear. The fortification was roughly rectangular in plan with the eastern wall deviating outward about eight metres. It was made of mud and mud-brick wall of 2.2m width and was riveted by stonewalls of 1.6m width on both sides. There were bastions on all corners. The height of the wall was about 3.37m to 4.15m on different sides. The wall was about 4.8m to 5m wide at the top and about seven metres at the base. The sides of the fortification wall were plastered with mud (Misra *et al*. 1995; 1997; Misra 1997; Mishra 2000).

The economy of the people was primarily based on agriculture and stock-breeding and was supplemented by hunting, fowling, fishing and gathering of forest products. People cultivated wheat (Triticum sp.), barley (*Hordeum vulgare L*.), lentil (*Lens esculenta Moench*), common pea (*Pisum arvense L*.), finger millet (*Eleusine caracana L*.), Itallian millet (*Setaria italica Beauv*.) and panicum millet (*Panicum sp*.) (Kajale 1996: 98-102). The domesticated animals were cattle, sheep/goat, buffalo and pig in the descending order of their majority (Thomas and Joglekar 1996). The industrial activities of the people included pottery manufacturing, copper smelting and reworking. Although a number of semiprecious stone beads were obtained, no *prima facie* evidence of semi precious bead manufacturing was registered. However, the people manufactured different kinds of steatite beads at the site right from the early phase.

30 radiocarbon dates of Balathal have been obtained from the Physical Research Laboratory (PRL), Ahmedabad. The beginning of the mature phase has been dated to 2500 BC and end of the Chalcolithic culture has been dated to 1600 BC. Therefore, the beginning of Chalcolithic culture at Balathal can well be placed in the opening of third millennium BC.

The Chalcolithic Ceramics

The ceramics data were meticulously collected in stratigraphic order, practically, from every five centimetres of all the trenches of the excavations. These were classified into different wares, shapes and forms and counted and weighed. The classification system was based on the texture of the clay used in manufacturing of the pottery or in other words was primarily fabric-centric. However, the attributes for the ceramic classification were drawn from the observations made in the study of contemporary potters' techniques of the region. The attributes were based on the manufacturing modalities, i.e. clay types and their processing, making of vessels—by hand or wheel or both, decorating methods and colour preferences, surface finishing, and firing methods. Nonetheless, due importance was given to the vessel types, i.e. shapes and forms, and their functions.

The Chalcolithic ceramics have been divided into three developmental phases; (A) Beginning phase, (B) Transitional phase and (C) Mature phase. The Beginning and Mature phases have two sub-phases each—early and late. The ceramic phases have been identified on the basis of refinement or modification of previous technology or introduction of new technology and new types of vessels or degeneration of existing ceramics techno-typology.

(A) Beginning Phase: The ceramics of this phase have been collected from the lowest level of the habitational deposit in the central portion of the mound. Two types of wares have been identified on the basis of their fabric types and manufacturing techniques, viz. fine and coarse wares. The former comprises five wares; (1) Sturdy Red, (2) Black-and-Red, (3) Reserved Slip, (4) Perforated and (5) Buff. These wares are made of fine clay and are well baked. The vessels have well burnished surfaces. These wares comprise dining and other sophisticated vessels.

(1) The Sturdy Red ware is treated with a coat of thin red slip which is often worn out. The fabric is soapy and very close to the fabric of Tan ware of Phase-C. This ware is represented by a group of constricted-necked storage jars with thick, plano-convex or beaded rims and oval bodies. Some medium sized pots and a few stands with flared bases are also noted. These vessels are potted on wheels and also moulded by hand. The body is uneven while the rims exhibit evenly placed fine striation marks. Probably the body is dabbed with dabber and anvil method.

(2) The Black-and-Red ware is slipped on one or either side and comprises mostly bowls and a few *lotas*. The vessels have black inner and outer rim portion and red outer bottom portion. There are linear designs executed in white colour in the inner

surfaces of the vessels as well as on the rim portions. The *lotas* are found undecorated.

(3) The reserved slip ware is used as a technique of decoration in this phase. No distinct fabric and vessel styles are noted in this phase. The designs are made with application of two slips of different shades on a vessel surface in a consecutive sequence. The second slip is applied after the first slip dries up completely. Immediately after the application of the second slip, a number of designs are executed by simply removing the upper wet slip with the help of a comb like brush. In the process, the underlying slip surfaces out at the places where the upper slip is removed. In this manner designs like multiple wavy lines, parallel lines and superimposition of both designs are made. The different shades of slips create designs of bichrome effect. This ware comprises dishes, bowls-on-stand, narrow-mouthed small pots, etc.

(4) Perforated ware is recovered in few fragments. No complete shape, except for a cylindrical vessel slightly convex at the lower end, is noted in this ware. Perforations are made all over the body.

(5) The Buff ware fragments are found in very low numbers. Some of these are painted in black or dark brown colour. The common vessels are small pots.

The Coarse wares—(6) Red Slipped, (7) Coarse Red and (8) Grey—are made of clay with lot of coarse sand. The vessels are not perfectly baked. At first, rough outs of the big vessels, such as big jars or *handis*, are made on the wheel and are dabbed subsequently to their desired size and shape. All the vessels, except for the small vessels, are rusticated at the bottom and are decorated below the neck with a line of simple incised designs.

(6) The vessels of Red Slipped ware are usually slipped on the outer upper halves and the bottom portions are rusticated. The rustication is made by applying a coat of sand mixed clay on the surface while the vessels are still in wet condition. The common vessels are jars and *lotas*.

(7) The Coarse Red ware is devoid of slip and is not rusticated. It comprises handmade vessels. The shapes found in this ware are jars, *handis* and dishes.

(8) The Grey ware is a replica of the Red Slipped ware, in terms of the external manifestations, except for the surface colour. The grey colour of this ware is formed in the closed firing process. The ware consists of cooking vessels, such as jars and *handis*.

In the later part of this phase a few different kinds of wares are registered. Among them the Painted Red Slipped and the Burnished Red Slipped wares are noteworthy. The Painted Red Slipped ware is treated with a dull red slip on the entire outer surface, over which a deep red slip is applied on the upper half of the vessels. The lower part is not rusticated in this case. However, using the same dark red slip various geometric decorations are made on the dull red background. The common designs are cross-hatched pendant triangles, suspending wavy lines, etc. Different types of narrow-mouthed jars are noted in this ware. The Burnished Red Slipped ware has an upper highly burnished red slipped portion and lower rusticated portion separated by a appliqué ridge decorated with nailing marks. The ware comprises jars of different varieties—short-necked, wide-mouthed and constricted-necked, basins and dishes-on-stand.

(B) Transitional Phase: This phase is called 'Transitional' for it establishes a connecting link between the 'Beginning' and 'Mature' phases. In this phase all the wares of earlier phase are present initially along with a few new kinds of wares. In the end of this phase, all the wares of Mature phase are seen which display characteristics of 'Aharian Pottery'. This phase has been identified in the lowest level (layers 21 to 19) of trench HX2. Stratigraphically, this phase precedes the construction of central fortification enclosure. The fine wares have burnished surfaces and the coarse wares are decorated with panels of incised and appliqué designs bordering the slipped and rusticated portions. Among the fine wares, the Fine Red ware is worth mentioning. It comprises three types of wares such as Sturdy Red, Self-slipped Red and Unslipped Red wares. The Sturdy Red ware is same as described above. The surface of Self-slipped Red ware is polished in such a way that it appears like a slip. Hence, the name 'self-slipped' is coined. It comprises jars and pots akin to Harappan-types. Only one instance of incised design and two painted potsherds are noted in this ware. The paintings are done in red and black colours. The Unslipped Red ware has a very sturdy and fine-grained fabric. The ware is neither

burnished nor decorated. The striation marks on the inner surface and brick red core of the potsherds indicate that the vessels are turned on a fast wheel and baked at a high temperature. The common vessels of this ware are shallow dishes and probably dishes-on-stand. However, no stand is noted in this ware. The dishes have flat base, straight or convex profiles and incurved simple rims. This is non-Aharian pottery and is totally alien to this region.

(C) Mature Phase: In this phase a total of 10 wares are noted. All these wares indicate that the pottery making technology had developed to its par, accentuated with superbly slipped and burnished plain vessels. A marked increase in the percentage of fine wares is noticed. A large number of new vessels are introduced. The coarse wares are decorated with incised and appliqué designs. The vessels are largely potted on fast wheels. Besides, dabbing, hand-moulding and luting techniques were used in pot making. Some vessels are composite in nature. These are made in two or three parts, such as neck, body and base and luted together immaculately. All the wares are slipped other than the coarse Red ware and Perforated ware.

The ceramic assemblage, in this phase, forms two broad groups—fine and coarse wares. The fine wares are—(1) Thin Red, (2) Black-and-Red, (3) Tan and Chocolate slipped, (4) Reserved Slip, (5) Perforated and (6) Buff (Painted) wares. The coarse wares are—(7) Thick Red Slipped, (8) Coarse Red and (9) Grey wares.

Fine wares are made of well-refined clay, kneaded to a well-levigated condition and are potted on fast wheels. The wares are baked uniformly at a high temperature. They commonly comprise dining vessels and also a few storing vessels.

(1) Thin Red ware constitutes bowls of different forms. Deep convex-sided bowls of different sizes and forms with thin rudimentary rims and round bottoms are commonly found. The slip applied on the outer surface is plum red in colour. A line of punctured designs or two or three cordons—low ridges—are often made on the shoulder of bowls. Besides, a few *lota* or jar/pots are present in this ware.

(2) Black-and-Red ware continues but improves in quality. The bowls are convex-sided and have highly burnished, well demarcated black and red portions on the outer surface. The black inner and outer top portions are elegantly decorated with white pigments. The designs comprise both geometric and non-geometric motifs. A set of two or three cordon designs are executed on the shoulder of some bowls. Apart from the bowls, a few *lota* type jar/pots are also present in this ware.

(3) Tan and Chocolate Slipped wares are identical other than the colour of slips applied on them. They share many common characteristics, such as similar fabric, manufacturing techniques, shapes and forms. It is interesting to note that some vessels, for example dishes or basins, are slipped with two colours, tan on the outer and chocolate on the inner surface. These vessels represent replication of Black-and-Red ware. The thin section study has also proved that the clay used in these wares is similar in terms of their mineral composition and texture. These wares comprise dishes, dishes-on-stand, basins, covers and big and small jars. The dish-on-stand is made in two or three parts—dish, stem and base or stand—and are assembled meticulously. There are three types of dish-on-stand noted in these wares, viz. (a) dish-on-stand with a short stand and without stem, (b) dish-on-stand with a long stem and short stand, and (c) dishes-on-stands with a big, wide and tall stand. A number of variations are seen in all these types of dish-on-stand. The jars are made in ring method. In this method, a number of rings of clay are joined one above the other to form the body of the jar. The rim portion is separately made on a wheel and luted to the pot. The joints of the rings could be noticed on the inner surface of jars. Sometimes, these jars, after completion, are turned on the wheel to create a uniform shape. Generally, these jars break at the joints.

(4) Reserved Slip ware remains are same as noted in the previous phase, however, the fabric and vessel forms have been standardised. Two types of this ware defined by their texture of fabrics and colour of slips are noted, such as fine and coarse, and red and black. The common vessel forms are dish-on-stand, bowl, bowl-on-stand, and small narrow-mouthed pots.

(5) Perforated ware is present in the form of a tall, cylindrical vessel with small and dense perforations. However, no complete vessel is found from the excavations. These are made in the coiling method; one can see the rings or ridges on the inner side of

the vessels. Some of these are plain and some have a thin red wash applied on the outer surface.

(6) Buff ware is represented by a few fragments and is same as described before. The fragments are decorated in black or purple colour and the designs comprise birds, floral, geometric and non-geometric motifs. Some of the designs are leaves with margins and mid ribs or crosshatched leaves, peacock holding a grass in the beak, lines and strokes of different kinds. These vessels are certainly brought from outside by the inhabitants and are good indicators of cultural contacts.

Coarse wares are made of sandy and gritty clay. These are made partly on wheels and partly by hand moulding. Most of the vessels are manufactured in two stages as described in the beginning phase and are not well baked. The slip is applied from the orifice to the waist of the vessels and the lower portions are left unslipped but are often rusticated barring the small vessels such as bowls, jar/pots and lids. Multiple panels of incised and appliqué designs form the dividing line between these two parts. The incised designs form geometric and non-geometric patterns and the appliqué designs are found in the form of roundels, knobs and ridges. A number of simple artistic methods have been used to decorate the vessels. Some of them are-

Incising - A sharp and pointed tool has been used for executing incised designs. The designs are horizontal lines, wavy lines, zigzag lines, strokes, arcs, crisscross lines, chevron patterns and herringbone patterns. These are made in combination with one another.

Combing - A number of multiple, parallel wavy or meandering lines are made in this method. Probably, a comb-like tool was used to make these designs.

Cutting - Cut marks are usually made on the ridges that separate slipped and rusticated portions. These marks are made with help of a sharp implement.

Puncturing - This is another popular design noted in the forms of triangles, dots and strokes. This design is executed rapidly with a sharp instrument.

Scoring/etching - The designs made in this method are triangles, squares and rectangles. These are executed by scoring out a little clay from the surface.

Stamping - A variety of stamped designs are noted in this ware, such as circles, triangles and rectangles. These designs are executed by stamping one end of different shapes tool on the pot surface.

Impressing - Fingertip impression is a very common design in Thick Red Slipped ware. This design is made in a chain of single or double rows. Particularly the appliqué ridges are impressed by fingertips in different ways such as overlapping each other or spaced away from each other. It has been noticed that the execution of fingertip impression was made from right to left. Perhaps the vessel was hold horizontally with the left hand and finger tip impressions were made from top to bottom with the right hand.

Nailing - The potters have used their nails to mark a series of designs on the ridges or cordons.

(7) Thick Red Slipped ware has a red colour slip applied from the top to the waist of the vessels. This ware is multi-purposely used for all functions, such as storing, carrying, cooking and dining. The vessels of this ware in their descending frequency are big jars, small jars, *matkas*, *lotas*, bowls, dishes, basins, dishes-on-stand, bowls-on-stand and lids.

(8) Coarse Red ware is meagrely present. This ware has a very coarse fabric and is devoid of slip and decorations. It constitutes small pots, basins, bowls, pans and cooking pots. Most of the vessels are made by the hand moulding method.

(9) Grey Slipped ware is a replica of Thick Red Slipped ware. This ware is baked in closed firing method to acquire the grey colour. It comprises cooking, storing and covering vessels, such as *handis* of different sizes, pans, basins, storage jars and lids. Some basins have thick ledges below the rims and the rim is modified into three upright, flat paddle-like handles. These handles are handmade and unslipped. Like Thick Red Slipped ware the Grey ware vessels are also made in two stages; firstly a rough out of vessel is made which undergoes a dabbing procedure in the next stage to achieve the desired shape and size. However, a number of vessels in this ware are made in moulding method. The lids are unique due to their peculiar handles. Some of the handles are animal-like and some are simple knob-like or T-shaped.

In the late Mature phase deterioration of ceramic manufacturing technology is clearly observed. The

quality and percentage of Fine wares declines sharply. On the contrary, the Coarse wares improve in their quality and percentage, however, they degenerate quite faster towards the latter half of this sub-phase. All the wares, except for the Reserved Slip, Buff and Chocolate Slipped wares, continue in this phase. A new pottery type called ‘Cut Ware’ is introduced in the beginning of this phase. This is made of fine well-levigated clay. The vessel forms of this ware are rather unclear for their highly fragmented condition. The vessels possess a number of slits of different shapes and therefore break easily into small pieces making their shapes unidentifiable.

The analysis of the wares and vessels of this sub-phase has divulged very important events related to the changes in the lifestyle of the people, such as transformation in the economy and subsistence pattern of the people due to climatic fluctuation. An acute water scarcity in the vicinity of the site of Balathal is evident from the gradual increase in the water storing and carrying vessels (Mishra 2000, 2002-03). The internal dynamics that prompted such changes in the lifestyle of the people and ceramic techno-typology have been studied in detail elsewhere by the author (Mishra in press).

Discussions

In the Beginning phase (A) at Balathal we notice the people had quite advanced knowledge of house construction and pottery making. They also knew the technique of steatite bead making. The people’s know-how of copper technique is not very clear in the absence of evidence of copper implements. However, they cultivated barley and lentils and domesticated cattle and sheep/goats. All these evidences apparently lead us to conclude that the people migrated to Balathal having evolved elsewhere. The study also divulges a steady transformation in the lifestyle of people with the enhancement of economic standard and population growth in Mature phase (C). The introduction of sophisticated utensils, enhanced housing patterns, use of copper artefacts, ornaments, animal and plant remains endorse the above assumptions. Besides, one can also conjure up the socio-political and religious aspects of the people by piecing together the traces of various group activities, construction of public architecture and objects related to the primitive religions. However, here we are only concerned with those aspects which are well reflected in the ceramics study.

The ceramics repertoire of Balathal provides an excellent database to understand the gradual development of the technology and artistic skills of the people from a nascent stage to an evolved one. The economics of pottery manufacture in various phases at Balathal has been discussed below.

The ceramics manufacturing involves a number of organised activities such as raw material procurement, processing and fabric preparation, potting methods and surface treatments, management of kilns and firing, storing and supplying of final products, etc. Every step has its own economics governed by the major factors like necessity or demand of products, marketability, competition and profit. One has to be slightly judicious while pressing for this kind of study and should understand various stages of ceramics production, i.e. the typology of ceramic production ranging from simple to complex productive systems. Van-der Leeuw has classified ceramics production into four categories as described below (Van-der Leeuw 1977: 68-76).

(1) Household Production: This is the simplest level related to the earliest ceramics production. Pottery is manufactured by every household with simple techniques and little investments in raw materials and tools. Pottery is handmade and fired in the open.

(2) Household Industry: Production of ceramics is not a fulltime occupation but could be used as a supplement to the limited agricultural production. Ceramics are still produced at the household level, though much production is oriented towards trade or sale beyond the household. The technology is still relatively simple.

(3) Workshop Industry: Pottery production becomes a fulltime occupation and specialists work with highly skilful and artistic innovations. Marketing is done directly or through middlemen.

(4) Large-scale Production: Involves a large number of employed labourers for large-scale production mainly for long distance trade.

Let’s have a look at the Chalcolithic ceramics repertoire of Balathal in the light of Van-der Leeuw’s proposed typology of ceramics production.

Phase A: Beginning Phase—The Household Industry

There are eight types of wares (Fig. 1) manufactured by the people, which have been categorised primarily on the basis of their nature of fabric and colour of slip. Most of the vessels are composite in nature, which are made in different parts and assembled together. A slow moving wheel was perhaps in use for making the vessels of fine wares or holding the vessels for final make up. The decorating patterns are quite simple. Most of the vessels are either plain or embellished with a few strokes of incised designs below the neck or an appliqué band at the waist. The painted decorations are noted only in the Black-and-Red ware, which basically comprise simple linear designs. The Reserved slip ware is the handiwork of the potters of this phase. There are solid evidences for the different stages of experimentation and gradual evolvement of reserved slip technique in this phase, though some of the finer pieces have certainly been brought from elsewhere. Similarly the Painted Buff wares have also been brought from outside as suggested by the fact of their extremely limited occurrence. So, there was exchange of specific luxurious wares, even though pottery manufacturing was in a developing stage in this phase. The analysis of vessel categories singles out the popularity of two major forms—jars and bowls—in this phase followed by jar/pots, basins and dishes (Fig. 2). The styles and sizes of vessels firmly suggest that they were not fully standardised in this stage. The above discussion clearly envisages that the ceramics production was limited to the households but had reached out beyond this boundary to the stage of 'household industry'.

The appearance of a few new categories of pottery in the later part of the Beginning phase (A) suggests fresh contacts with other places or influx of new groups of people from outside. There was certainly very limited occupancy or partial desertion of the site in the end of Phase-A. The evidence of a variety of new pottery types and shapes alien to the Ahar Culture in the subsequent phase (B) termed as 'Transitional phase' strongly endorses the above assumptions. So, the site intermittently witnessed fresh arrivals of different groups of people in this time. In the later part of Phase-B we come across the typical 'Aharian type' of ceramics following which the settlement of Mature phase (C) flourishes at the site.

Phase C: Mature Phase—The Workshop Industry

The Mature phase (C) ceramics repertoire of Balathal comprises ten types of wares (Fig. 1). The density of pottery increases from 99.5 per cubic metre in Phase-A to 230 per cubic metre in Phase-C. This indicates the volume of pottery manufactured and/or used in this phase is more than twice of that of previous phases. Apart from this, there has been a marked advancement in the techniques and artistic skills of the potters. Introduction of the fast wheel has improved the quality and appearance of the vessels. However, the composite vessels constitute the majority of the pottery assemblage. The vessels are still manufactured in different parts and assembled later. These are now uniform in shape, size and are better finished. The people have preferred plain and highly lustrous vessels over the decorated ones. Therefore, we find most of the fine wares are undecorated and well burnished. However, the coarse wares are decorated with incised and appliqué designs. The designs are simple but elegant. The number of vessel categories or forms has dramatically multiplied. However, they (vessel forms) have been standardised in terms of their fabric, manufacturing methods, colour, shape, size and decorative patterns. The frequency of bowls and jars tops the list followed by dishes, jar/pots, *handis*, dishes-on-stand and others in descending order (Fig. 2).

In this period the ceramics of Ahar culture have spread across the boundary of Banas valley to the Narmada valley or the Malwa region and also to the Gujarat region. This was certainly facilitated by the cultural contacts, and the trade and commerce established between these regions.

It is clear from the above discussion that the ceramics production had reached at a level of technical and artistic superiority and had been a specialized fulltime occupation in the Mature phase. It had taken the shape of 'workshop industry' for the mass production and marketing to different places.

Now if we look at the bulk of ceramics in the two above major phases—the Beginning and Mature phases—a gap in terms of technological advancement, stylistic achievement and marketing capability of the potters as well as improvement in the economy-subsistence and choice or standard of the people becomes apparent. One does not see the complete development of ceramics from the nascent stage to the evolved one at the site itself. A number of wares like Thin Red and Tan/Chocolate Slipped have been directly introduced. It is not that

the people have all of sudden discovered a new source of supply and overnight adjusted or improved their lifestyle. Getting influenced by and the introduction of new technology is a gradual process before they get accepted. There is no *prima facie* evidence for a long course of interaction prior to the Mature phase at Balathal. So, what did happen during this period? A cultural break between these two phases is strongly evident. The hiatus is clear with the appearance of new kinds of potteries alien to the parent culture which we have noted in the end of Phase-A and in Phase-B at Balathal. There are many other evidences which support this assumption like the construction of fortified enclosure right above the heart of Phase-A settlement indicates the people had already deserted the place. The above question has a wider scope. First of all this has to be tested in other Ahar Culture sites to prove whether the break is regional or universal. In either case there is a lot of scope for further investigations to arrive at a solid conclusion (see Mishra 2002-2003 for detail).

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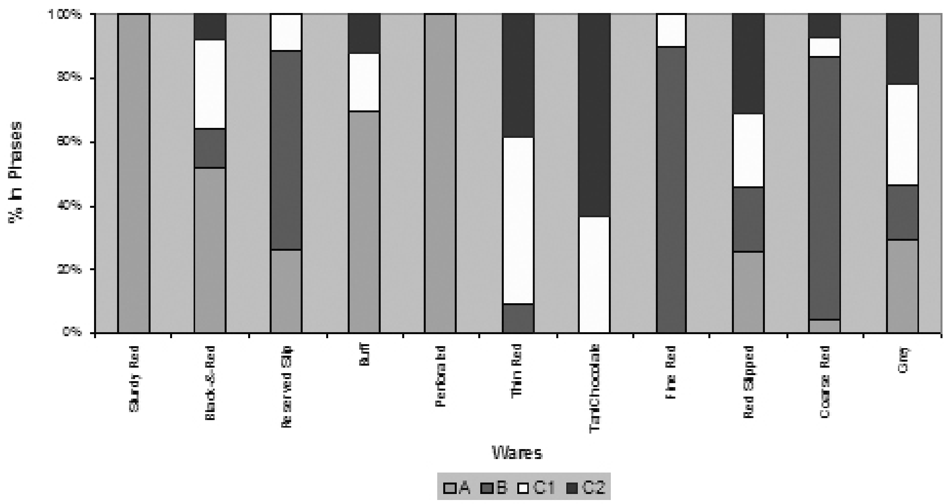


Fig. 1: Percentage of wares in different phases

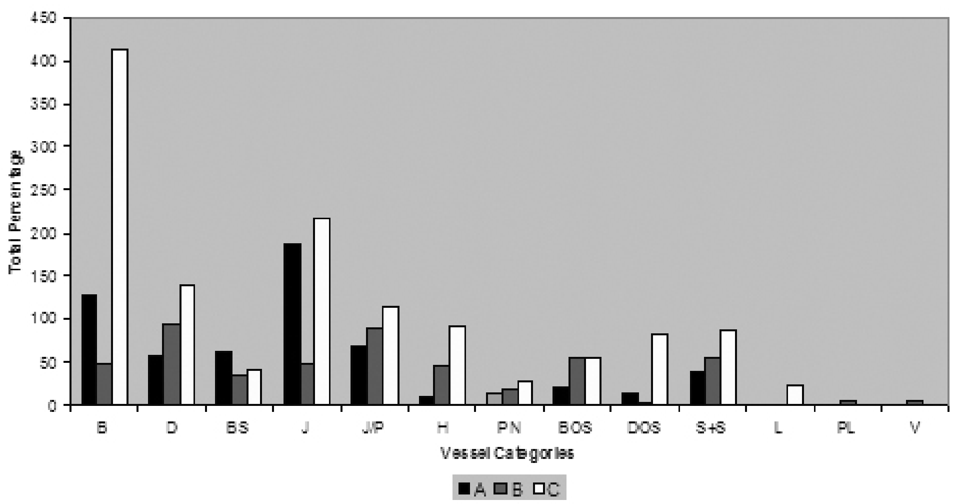


Fig. 2: Total percentage of vessels in different phases

Abbreviations:

B- Bowl, **D**- Dish, **BS**- Base, **J**- Jar, **J/P**- Jar/Pot, **H**- Handi, **PN**- Pan, **BOS**- Bowl-on-Stand, **DOS**- Dish-on-Stand, **S+S**- Stand + Stem, **L**- Lid, **PL**- Platter, **V**- Vase

B&R- Black-and-Red Ware, **TNRW**- Thin Red Ware, **FRW**- Fine Red Ware, **TSW**- Tan Slipped Ware, **RSVW**- Reserved Slip Ware, **RSW**- Red Slipped Ware, **TKRSW**- Thick Red Slipped Ware, **CRW**- Coarse Red Ware, **GW**- Grey Ware

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PRE- AND PROTO-HISTORY OF SOUTH-WESTERN ANDHRA PRADESH

V. Rami Reddy

Location and General Features

Southern-western Andhra Pradesh (13° 40° and 15° 58' N. and 76° 50' and 78° 30' E.) covers the western part of Kurnool district and the whole of Anantapur district. It is bounded on the north by Raichur district; on the west by Bellary, Chitaldurg and Tumkur districts of Karnataka; on the south by Kolar district of Karnataka; and Chittoor district of Andhra Pradesh; and on the east by Cuddapah district and a larger part of Kurnool district of Andhra Pradesh (Rami Reddy 1968).

The region forms part of the northern extremity of Mysore plateau. Its physio and geographical features are largely similar to those of the neighbouring Bellary and Raichur districts. It is an open country from the plains of which rise a number of mostly castellated, granite hills. These provided strong defence for the early settlers. The open stretches between these hills are to a large extent covered with back cotton soil. The chief physiographic characteristics of the region are aridity, treelessness and general poverty of the soil.

The main geological formations of the region consist of the Archaeans, the Dharwars, the Cuddapahs and the Kurnools. The Archaean and Dharwar systems occur all over the region, while the Cuddapah and Kurnool systems are found only in Tadipatri taluk and in the eastern portions of Gooty and Anantapur taluks. The three rock groups - igneous, sedimentary and metamorphic occur in various proportions all over the region. The granitoid hllls in this region are traversed by numerous trap dykes of the igneous rock group of great size and length. They often rise into bold crests and ridges forming a very conspicuous object in the landscape. The basalt occurring in small veins in the dykes had been extensively exploited by the Neolithic people for making their implements. Besides, the region is rich in mineral resources like gold, diamond, baryte, steatite, limestone, abrasives, clay, iron ore, soap stone, etc.

Six distinct varieties of soils - black clay, black loam, black sand, red clay, red loan and red sand occur. Of these, the black soil is the best quality which is largely used for growing groundnut and cotton crops.

The rivers Tungabhadra, Pennar, Chitravati, and Hagari with its tributary Chinna Hagari form the main drainage system of the region. Climatically, the region is extremely dry. March, April and May are the hottest months in the year during which the temperature fluctuates between 98°F and 107°F. The southwest monsoon cools down the region in June. It enjoys the winter season from November to January when the temperature falls to 62°F; with the daily minimum temperature varying between 62°F and 68°F. Owing to its peculiar geographical location in the centre of the peninsula, Southwestern Andhra Pradesh suffers from scarcity of rainfall. The rainy season lasts from August to October with an average annual rainfall of about 56 cm, which is not equally distributed all over the region.

Earlier Works

The rich archaeological remains of southwestern Andhra Pradesh attracted the attention of some geologists and amateur archaeologists since the middle of the 19th Century. Robert Bruce Foote, a geologist, rightly regarded as the father of Indian prehistory, was the chief among them whose pioneering efforts have brought to light a vast collection of antiquities belonging to Late Stone Age, Neolithic and Megalithic cultures.

The earliest explorations resulted in recording a large number of megalithic monuments in Rayadrug and Dharmavaram taluks by C.J. Pelly, the Collector of the then Bellary district (Taylor 1852). This was followed by Captain Meadows Taylor's (l862) discovery of some more megalithic tombs at Kosgi in Adoni taluk of Kurnool district. The megalithic structures of Rayadrug area were also recorded in the Bellary district Gazetteer (Francis 1904). A countless number of megalithic monuments at Mudigal in Kalyandurg taluk have been described in Anantapur Gazetteer (Anantapur Gazetteer 1905). These were later visited by some members of the Archaeological Survey Department in the beginning of 20th century (Annual Progress Report, Archaeological Survey Department 1912-13).

The first discovery of Kudatini and Kupgal ashmounds by Captain Newbold in 1836 and the subsequent finding of a neolithic settlement by

Fraser in 1872 near Bellary and Sanganakallu excited the curiosity of Bruce Foote (Foote 1914) who, beginning from 1885, discovered several sites of Late and New Stone Ages, besides a few ashmounds, in this region. Foote's (1916) survey was confined to the northern part of this region. His deep interest and enthusiasm for archaeological research inspired others also to participate in the activity. Carnelius Cadrew, Reginald Ellis, and Major Wuchope were among them who made collections of antiquities.

During the 20th century, fresh light has been thrown on the Palaeolithic and Mesolithic cultures of Kurnool by the work of Cammiade and Burkitt (1930), followed after three decades by the work of Isaac (1960). However, very little new evidence on the Neolithic cultures of the district has come to light. In Anantapur district, particularly no work has been done since Bruce Foote's discoveries, through extensive remains of neolithic culture have been discovered in the adjoining Raichur and Bellary districts of Karnataka and Mahabubnagar district of Andhra Pradesh by Allchin (1960, 1961) and Subbarao (1948, 1949). For over the following two decades considerable evidence has been brought to light for the neolithic culture of Karnataka by the works of Krishna, Wheeler, Subbarao, Allchin, Seshadri, Sankalia and Nagaraja Rao. But the area to the east of Karnataka has remained unexplored. So it was intended to conduct an intensive and systemic exploration of the region to reconstruct its prehistoric cultures against the background of the then available evidence from Karnataka.

Present Work

Explorations were carried out by me during 1965-66 followed by an excavation in 1967 at the ashmound and neolithic site of Palavoy, which lies about eight kilometres to the southeast of Kalyandrug town in Anantapur district. These brought to light 14 Late Stone Aged (now Mesolithic) sites, 35 neolithic sites, 14 ashmounds, one iron smelting site and a large number of various types of megalithic monuments at 17 places, besides a number of megalithic settlements. Some of the known sites also were explored to make the account geographically comprehensive (fig. 1).

The sites are geographically distributed in the northernmost, northern, and central divisions respectively, consisting of Adoni and Alur; Uravakonda; Gooty and Tadipatri; Anantapur; Dharmavarm; Kalyandrug and Rayadrug taluks. In the southern division only in Kadiri taluk a Late Stone Age site was found. Other taluks comprising Hindupur, Penukonda and Madakasira have not revealed any remains of prehistoric man. However, further work in these taluks might yield the remains of early man.

Majority of the sites are of open-air type. They are either at the feet, slopes and tops of castellated granite hills, or in isolated fields or sometimes, on the river banks. The river bank sites are mostly on the Tungabhadra.

The Cultures

A detailed study, analysis and observation of the archaeological materials collected from the surface of several sites and those unearthed from the excavations at Palavoy unfolded a sequence of three district cultures: Late Stone Age (Palavoy I), New Stone Age (Palavoy II) and Iron Age (Palavoy III). These cultures could be reconstructed with the help of stratigraphy, techniques, typology, and state of preservation of the artifacts and non-artifactual remains. Besides, below the neolithic levels at Palavoy were found heavily patinated trap flakes showing striking affinity to those found in the excavations at Sanganakallu, which depict the Levallois type technique. As at Sanganakallu, the upper portion of this flake industry yielded a few microliths of chert and quartz similar to those of the Late Stone Age of our region. However, the exploration in the region did not yield any finds of Early and Middle Stone Age Cultures (now called Lower and Middle Palaeolithic Cultures), though Robert Bruce Foote had found a solitary cleaver of quartzite on the Vidupanakallu west hill from where relics of neolithic man were also found by both Foote and myself. Further investigations may however yield Early and Middle Stone Age tools if smaller areas are taken up for intensive exploration (Rami Reddy 1976, 1978).

Late Stone Age Culture

The earliest human relics occurred in the region in the form of artifacts of the Late Stone Age culture. These were found on the surface of 14 sites mentioned earlier and stratigraphically confirmed by the discovery of Pre-Neolithic period at Palavoy (fig. 2). Among the explored sites of this culture, eight are located in the Kurnool district and the remaining six in the Anantapur district. Seven of

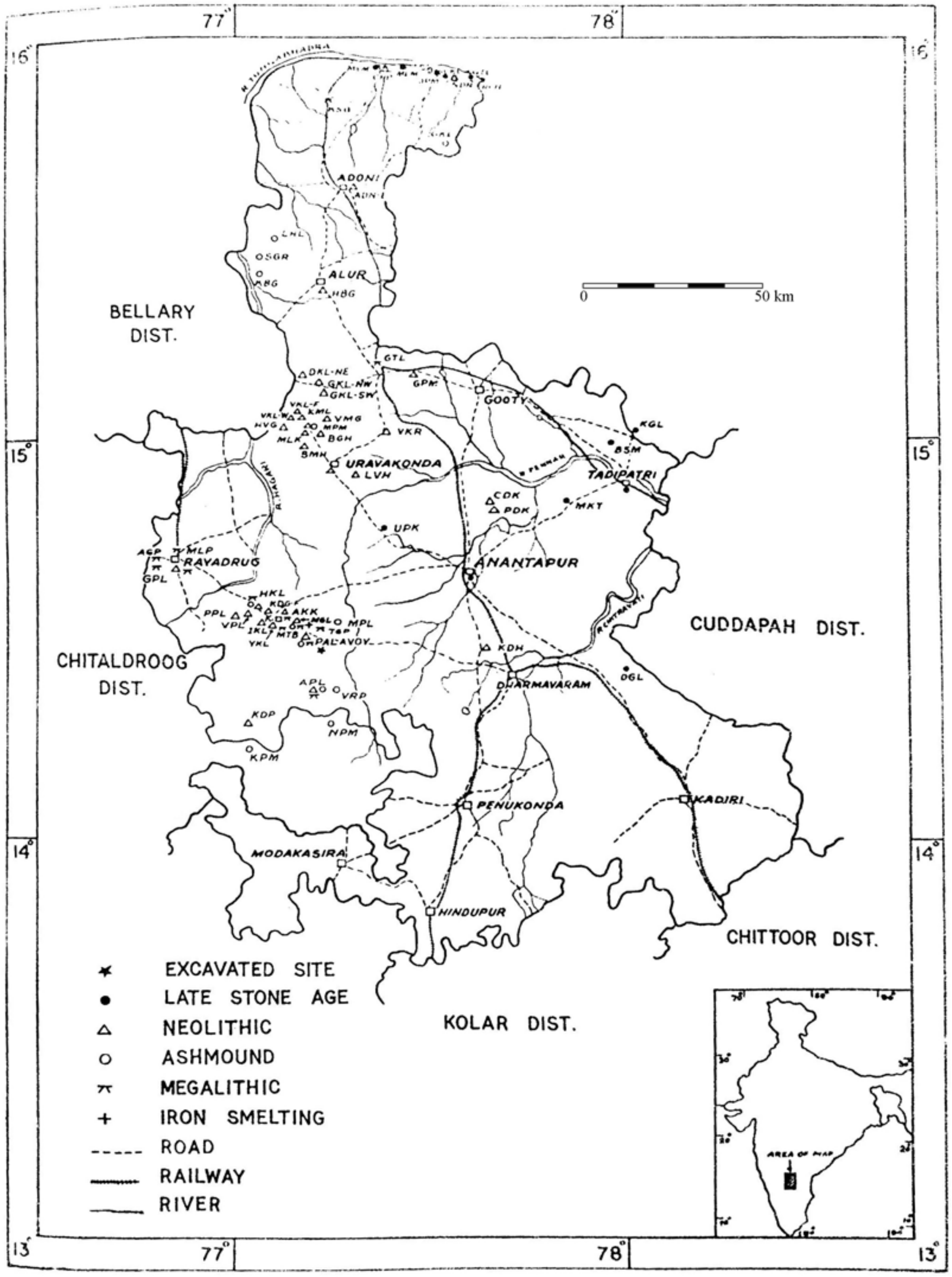


Fig. 1: Map of south western Andhra Pradesh showing the distribution of pre and proto historic sites

Keys: Late Stone Age Sites: ATP: Anantapur; BSM: Bogasamudram; CKL: Chinnakothaliki; DGL: Dorigal; GZL: Gurizala; JPM: Johrapuram; KGL: Kolimigundla; MKT: Muchukota; MLM: Mantra La Yam; MVM: Madhavaram; PKL: Peddakothaliki; RCH: Rayachoti; TPL: Ta.Dipatri; UPK: Udripikonda. **Neolithic Sites**: ADN-E: Adont East; ANK: Akkammakond; APL: Andepalli; BGH: Budaga Vi Hill; BMH: Buthamahal Hill; CDK: Chinnadandukonda; CHP: Chetnepalli; DKL-NE: Donekal Northeast; GKL-SW: Gadekal Southwest; GKL-NW: Gadekal Northwest; GPM: Gulapalyam; HBG: Ha Ttibelagallu; HKL: Hulikal; HVG: Havaligi; IKL: Idukal; KDG-F: Kalyandurg Fort; KDH: Kat Amadevudu Hill; KDP: Kunduripi; KML: Karakumukkala; LVH: Lattavaram Hill; MLK: Mallappakonda; MGL: Mudigal; MPM: Malapuram; NDN: Nagaladinne; PDK: Peddadandukonda; RDG: Rayadrug; PLY: Palavoy; PPL: Pillalap Alli; UKD: Uravankonda; VKL-F: Vidup Anakal Fort; VKL-W: Vidupankal West; VKR: Vajrakarur; VMG: Velpumadugu; VPL: Vitlamp Alli; YKL: Yatakal. **Ashmounds:** APL: Andepali; HKL: Hulikal; GKL: Gudikallu; KBG: Kancharabelagallu; KPM: Kolimpipalyam; LHL: Lingadahalli; MPL: Mallip Alli; MPM: Malapuram; MGL: Mudigal; NPM: Nagalapuram; PLY: Palvoy; SGR: Suguru; VPL: Vantareddipalli. **Iron Smelting Site:** MGI: Mudigai**. Megalithic Monuments:** AKK: Akkammakonda; APL: Andepali; HKL: HulikaL; MGL: Mudigal; MTB: Muthalabanda; PLY: Palavoy; TGP: Thimmaganipalli

the former sites are located on the bank of river Tungabhadra while the remaining one, namely, Kolimigundla, is located about half-a-kilometer south of the village on an open strip of rocky waste land with a sparse growth of stunted shrubs. Of the six sites in Ananatapur district, three are situated on perennial rivers of streams while of the remaining three, one each, situated on the bank of a seasonal stream, a small rocky hill and in a field respectively. From the above account of the distribution of the microlithic sites it can be concluded that the Late Stone Age folk in Southwestern Andhra Pradesh mostly lived along river banks in an arid and semi-arid environment (fig. 1). This kind of ecology is, however, comparable to that of Balia Nadi in Singrauli Basin, Birbhanpur in West Bengal, sites on the river Sanjay in Bihar, along the Mahi and Sabarmati in Gujarat, those on the sagileru in Cuddapah and Kurnool districts and locality 3 in Chittoor district. The location of some sites away from river banks shows that the Late Stone age people used these as camp sites with a food economy which might have been different from that of the river sites.

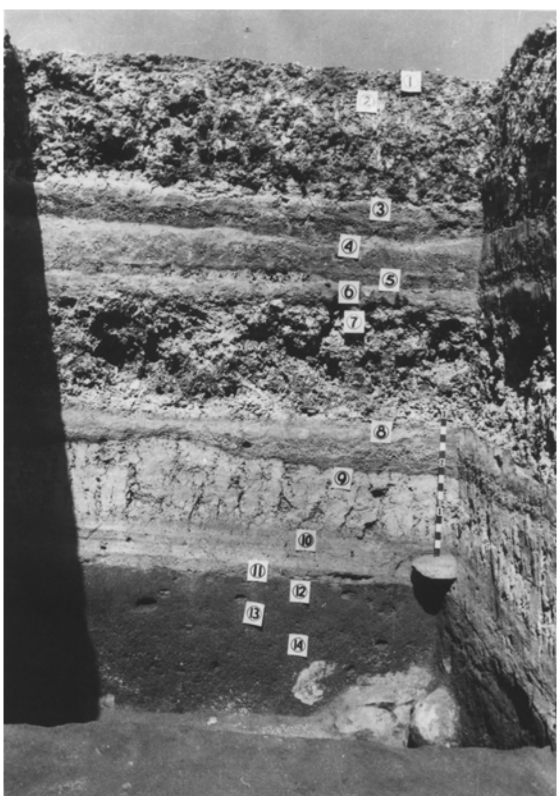


Fig. 2: Stratigraphy at Palavoy

The chief raw material used for the preparation of artifacts of Late Stone Age is chert of various shades though other rocks like chalcedony, agate, quartz, jasper, etc were also employed in small quantity. These rocks occur in the form of water-worn pebbles of various sizes in the case of river bank sites while on other sites the materials occur in the shape of nodules which appear to have been imported from distant places.

The Late Stone Age industry is based on blade production. Blade tools were produced by the technique of steep retouch. Typologically the industry is characterized by flakes, blades and microliths including backed blades, obliquely blunted blades, truncated blades and lunates. Other finished tools are points, borers, scrapers and notched flakes. The industry is basically non-geometric in character (fig. 3).

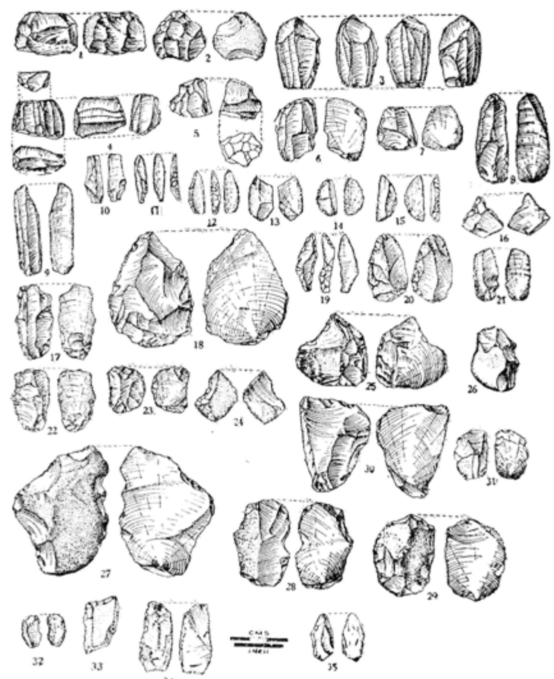


Fig. 3: Artifacts of hand made microlithic industry in the Mesolithic culture

Keys: 1. worked piece; 2. flake core; 3-5. blade cores; 6. core rejuvenation flake; 7. flakes; 8-10. untouched blades; 11. backed blade; 12. obliquely blunted blade; 13. truncated blade; 14-15. lunates; 18-20. points; 16&25. bores; 17, 21-24, 26-34. scrapers

The Pre-Neolithic period (Palavoy I) which comes from the upper portion of layer 14 touching the sterile layers from palavoy yielded flake cores, flakes, blades an obliquely blunted blade and a scraper (fig. 4). This industry though poor in quantity and types is strikingly similar to that from the surface. This microlithic industry overlies the

patinated flake industry found in the basal zone of layer 14. To say when this new industry arrived at and from where, we do have no direct evidence. Both the Pre-Neolithic industries of palavoy are devoid of pottery (Rami Reddy 1968, 1975, 1976, 1977c).

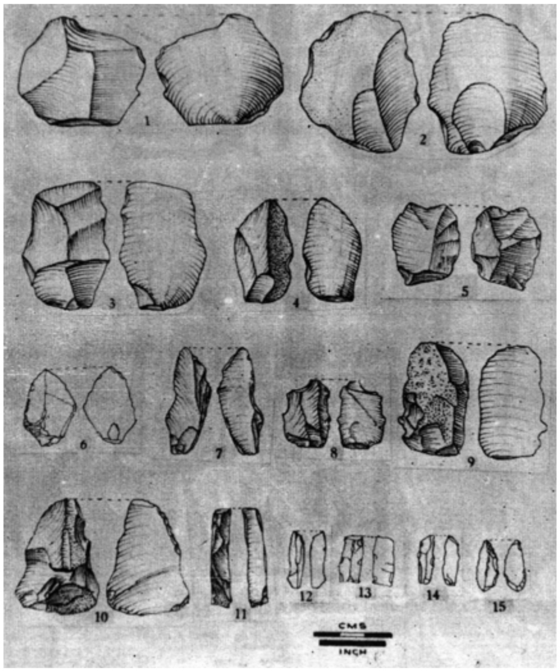


Fig. 4: Artifacts of the pre-Mesolithic and Mesolithic industries
Keys: 1-4: patinated basaltic flakes; 5. flake core; 6. core rejuvenation flake; 7-9. unused blades; 10. side scraper; 11. plunging flake; 12-14. unused blades; 15. obliquely blunted blade

From the nature and distribution of late stone age sites, raw materials and typo-technological aspects it appears that the Late Stone Age culture originated locally probably from the painated trap flake industry.

Neolithic Culture

The next and better known period is marked by the Neolithic Culture equivalent to Palavoy II. This culture has been found at 35 sites of which four are located in Adoni and Alur taluks of Kurnool district and the rest in Anantapur district. In Anantapur district, the sites are concentrated in Uravakonda and Kalyandrug taluks touching the Karnataka state on the west and south, while in the other taluks like Dhannavaram, Rayadurg and Anatapur only stray sites have been found. Two of the former sites are on the bank of Tungabhadra river while the remaining are situated at the feet, slopes and tops of castellated granite hills which possess natural rock-shelters, open spaces covered by granite boulders and natural water-cisterns quite suitable for habitations (fig. 1). The granitoid hills in this region as well as in the neighbouring Bellary and Raichur districts are traversed by several trap dykes, which rise mostly in the form of crests and ridges. The close association of New Stone Age sites and granitoid hills indicates that the neolithic people preferred to occupy the granite hills not only for their habitations but to exploit the trap dykes to manufacture the pecked and ground stone tools which formed the chief artifacts of their technology. Thus the physiographical and geological features have remarkably contributed to the establishment of neolithic settlements in our region. This phenomenon is also seen in Bellary and Raichur districts because the physiographical features of these areas are largely similar to those of Anantapur and Kurnool districts (Rami Reddy 1968, 1978).

The evidence of this culture from the surface of several sites consists of pecked and grounds stone and blade industries, ceramics and beads.

The chief raw material for the manufacture of pecked and ground stone tools consists of dolerite/basalt and other rocks like epidote granite, granite, granodiorite, diorite, greenstone, pegmatite, schist, quartz, sandstone, and granite gneiss. The tools of this industry exhibit the three techniques of making - flaking, pecking and grinding for different purposes at different stages in the manufacture of a tool. The most important tools of the industry are 'axes' and hence some scholars even named the whole culture as "Polished Stone Axe Culture". Other types are adzes, chopper-chopping tools; core scrapers; chisels; flake tools including points, borers and scrapers; picks; rubbing stones; saddle queens; axe-hammers; hammer stones; sling stones; ring stones, anvils and a few miscellaneous tools (fig. 5). These tools occur in large quantities at the sites of Katamadevudu Hill, Velpumadugu, Budagavi Hill, Gulapalyam, Hulikal, Havalgi, etc. (Rami Reddy 1976b).

The artifacts of blade and microlithic industry have been chiefly made on chert of various colours and on small proportions of chalcedony, quartz, jasper, etc. The tool-kit contained fluted cores, crested guide flakes, unretouched blades, backed blades, obliquely blunted blades, truncated blades, lunates, a trapeze, points, borers, scrapers, etc. The raw materials, techniques of manufacture and typology of the industry are mostly similar to those of the

microlithic of the late Stone Age Culture, except in one respect, namely, the presence of the crested guide ridge technique in the industry of this period. Also the proportion of finished tools (11.36%) in this industry is slightly less than half of that in the Late Stone Age (23.53%), whereas the blade element is relatively more (25.97%) than that of the latter industry (18.53%), indicating the predominance of blade element in the technology. Besides creased guide ridge flakes, trapezes, characteristic of this culture are absent in the Late Stone Age Culture.

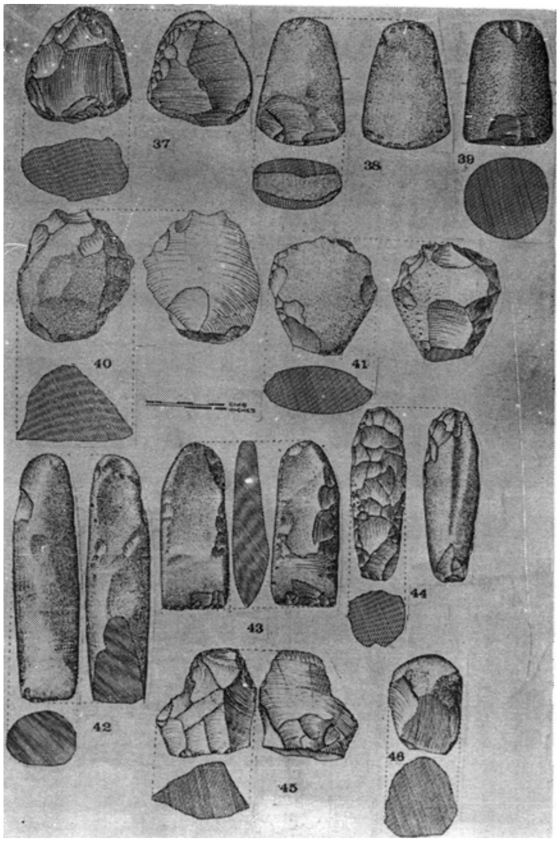


Fig. 5: 37-39: axe-hammers; 40. chopper; 41. core scraper (end); 42-43. chisels; 44. miscellaneous tool-chisel (?); 43. hollow scraper on flake; 44. hammer stone

The chief ceramics consist of handmade unburnished and burnished blotchy grey and dull red wares and a small quantity of black-on-red ware. The most common forms are globular pots of various sizes. Other shapes include spouted pots; basins; lugs; ladles and handles of pots; bowls; lipped vessels; carinated pots with high cylindrical neck. The decoration consists of horizontal bands in ochre paint, impressed, perforated and incised designs. Designs in black paint consist of simple horizontal and vertical bands, and short strokes on the rim, lattices, loops, chevrons or sometimes a broad horizontal and vertical bands, and short strokes on the rim, lattices, loops, chevrons, or sometimes a broad horizontal band from which are suspended several vertical zig-zag bands on the external surfaces of pots.

Objects of ornament in the form of beads of steatite and a few of agate, carnelian and chert occurred.

All these traits have been found in the excavations at Palavoy (Rami Reddy 1976; Fig. 6). The Neolithic Culture designated here as Palavoy II, and represented in layers 9 to 11, is separated from Palavoy I by a gap of two sterile layers. The excavations showed that the people lived in small circular or rectangular huts with walls of mud and roof probably of thatch. Later people of this culture knew the use of copper. Painted pottery, handmade, with the help of mould, is in large quantity (10.69%) and occurs in all the strata of this period (Rami Reddy 1978). The characteristic pot types of Jorwe and Nevasa are absent in this ware and it appears to be of local origin.

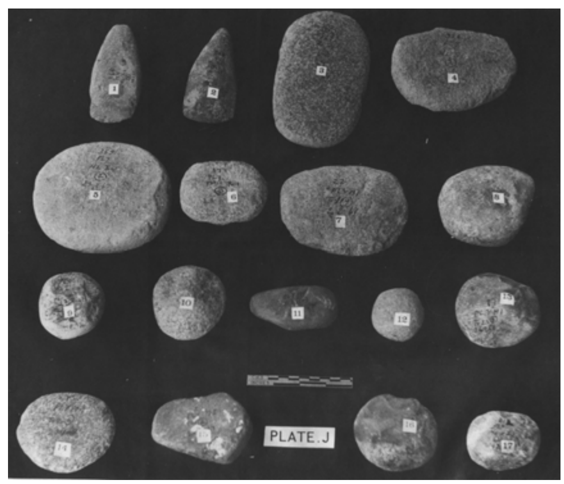


Fig. 6: Pecked and ground stone tools from Palavoy excavation

Bone tools comprising scrapers, blades and points occurred in this period. The first mentioned type of tools resembling ground stone axes in shape, size and technique of manufacture has been found for the first time in neolithic levels in India (Rami Reddy 1976, 1976a; figs. 7, 8). Other finds from this period include several unbaked clay objects and a grey ware disc. The clay objects are irregular in shape measuring 4.0 x 2.1 x 1.5 cm. on the average and are light in weight. These amorphous

objects could have formed primitive play things of neolithic children. The occurrence of four child urn burials indicated the belief of these people in future life. The dead were buried outside the houses. The people of this culture domesticated *Bos indicus* (OX) and *Bos biibalis* (buffalo), sheep and goats, hog and dog. The large number of bones particularly of cattle showing splitting, culling and chopping marks and charred condition throw light on the food economy of the people. These animals appear to have been domesticated for their milk and meat. Some of the cattle bones, particularly joints, showing heavy marks of concussion indicate that these animals were used for heavy and prolonged draft-work in agricultural operations. This is also indicated at Sanganakal1u. Besides, fishing and hunting appear to have supplemented their diet (Rami Reddy 1977a, 1987, 1988b, 1991).

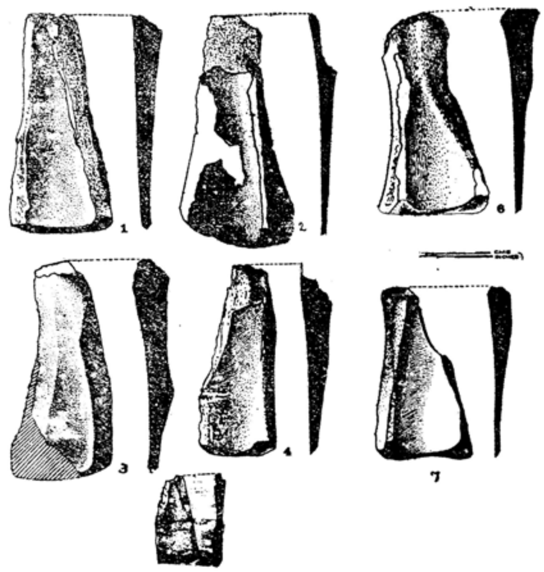


Fig. 7: Bone axe heads from Palavoy

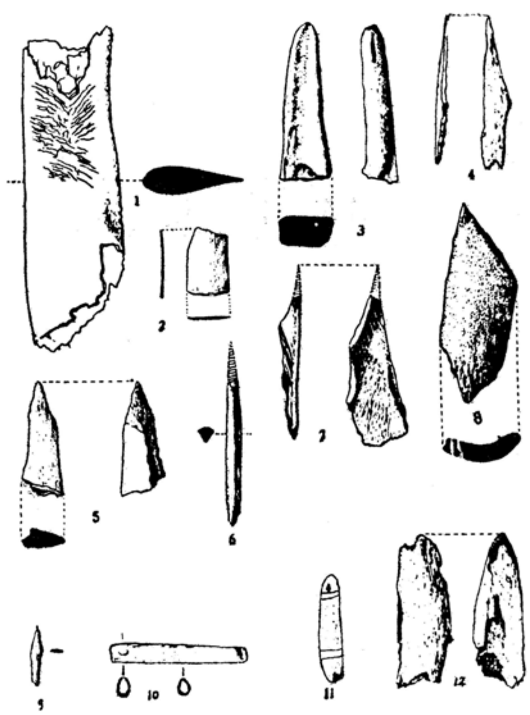


Fig. 8: Ground bone tools from Palavoy; 10 & 11 are from other sites

Plant remains like Zizyphus, Acacia or Dalbergia species reveal that the people lived in an arid climate (fig. 9).

The stratigraphical break between the Pre-Neolithic and Neolithic levels represented by two sterile layers indicates that the Neolithic people occupied the site long after the disappearance of the Late Stone Age Culture from this date. The late level (Layer 9L of the Neolithic period has given a radiocarbon date of 1965 B.C (Rami Reddy 1968, 1976, 1978).

Post-Neolithic Culture

The Post-Neolithic culture represented by Iron Age, which is designated as Post-Neolithic period (Palavoy III) at Palavoy. This is known from various types of megalithic monuments like port-hole cists, dolmens, circles and menhirs from 17 sites. Majority of these are associated with Neolithic settlements, while a few like those at Thimmaganipalli are a little away from them (Rami Reddy 1979). Megalithic black ware, black-and-red ware, red ware, chocolate-slipped ware and coarse grey ware were found at these sites. The common shapes are shallow dishes, bowls, basins, vessels with concave neck, carinated pots, ring stands, globular pots of big and small sizes and a wide trough. The decoration consists of incised and impressed types which occur chiefly on the exterior of red ware pots. Graffiti marks in the form of arrow-heads or squares occur on the external surface of pots of black-and-red red wares. Besides, discs of red and, black wares were also found (Rami Reddy 1968, 1976, 1978a, 1988a).

These evidences can be compared to those from the Post-Neolithic period at Palavoy. This period (Palavoy III) includes layers 8 to 2. Among these, layers 7 and 2 consist of vitrified ash deposits. These two layers have been separated by a fairly thick deposit of four layers (layers 3 to 6), each sealed by a floor. A similar floor occurs below

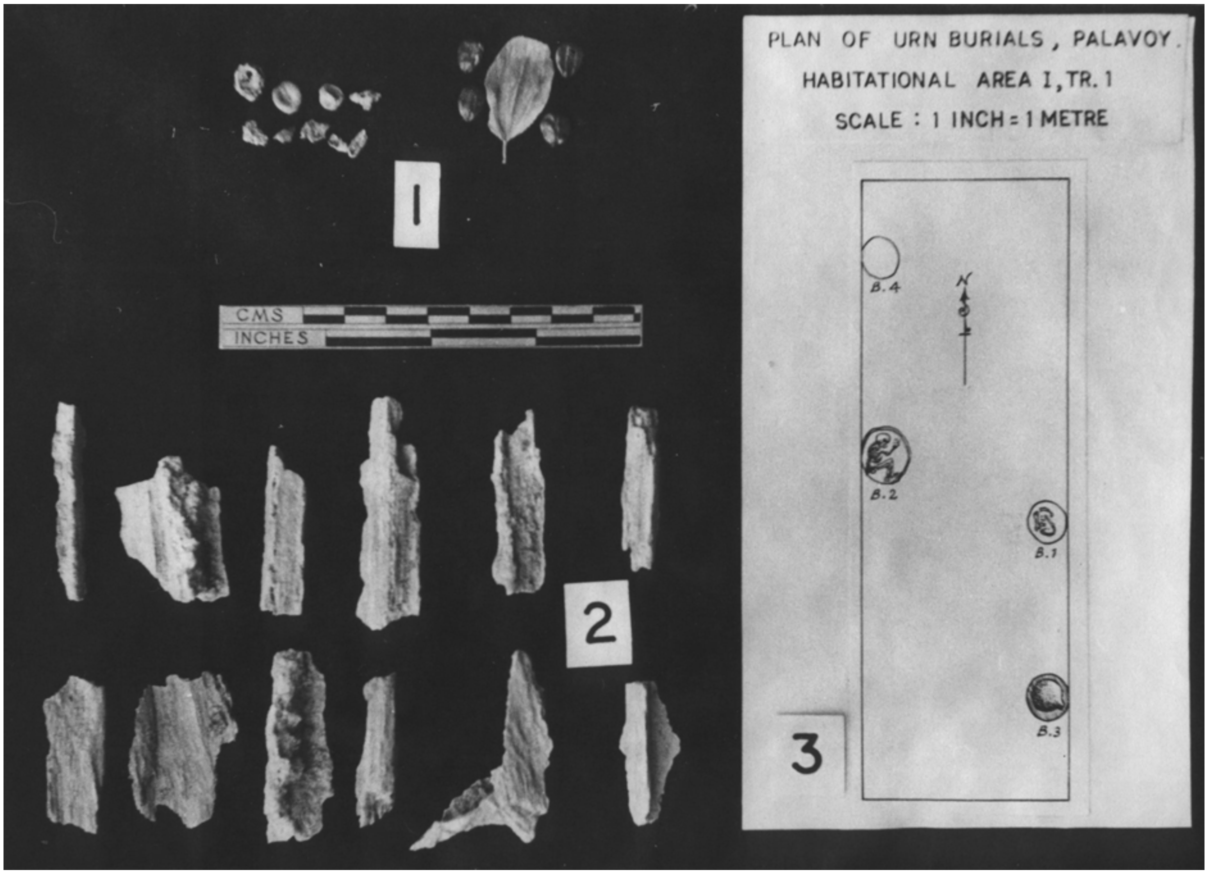


Fig. 9: Plant remains, bones and the plan of urn burial at Palavoy

layers 7. The deposits of all these layers differ strikingly in composition and contents from the strata of the earlier two periods. The arrangement of the vitrified ash lumps as seen in the section (fig. 2) recalls the shape of a number of small-sized kilns or ovens. The finds from this period are iron ore and slag pieces, an iron nail and a ring, and typical megalithic pottery of black ware, black-and-red ware, red ware and chocolate-slipped ware.

Domestication of cattle, sheep and goats is known from this period which directly succeeds the Neolithic but the date for it is not available. However, on the basis of our observation of the vitrified ash deposits and the archaeological evidence comprising the above, these are thought to be the result of iron smelting by Post-Neolithic communities. This has been further supported by the occurrence of iron ore and slag pieces on and around the ashmounds, megalithic monuments in the close vicinity and an iron-smelting site as at Mudigal (Rami Reddy 1988a) and a number of sites explored by me recently. Further, the geographical distribution of ashmounds in Southwestern Andhra Pradesh shows their invariable association with neolithic settlements and megalithic monuments. This is also clear when we look at the iron ore distribution map of south India which shows that these ahs-mounds are located in areas, where iron ores could be easily procured for smelting activities (Rami Reddy 1969, 1977b, 1990). Thus, our observations and archaeological evidence from the excavations do not add to the theory that the cow-dung was seasonally burnt by the neolithic pastoralists for some kind of ritual purposes as has been suggested by Allchin (1961, 1963).

This encouraging evidence, though barely sufficient, has surpassed the earlier evidences and has reopened the problem. However, to confirm our evidence at Palavoy, we suggest further excavation of some more well preserved ashmounds on a large scale to understand fully the purpose that lay behind the burning of cow-dung and by whom and when (Rami Reddy 1969, 1977b, 1990).

Concluding Observations

Our investigations for the relics of early man in Southwestern Andhra Pradesh brought to light a succession of three distinct cultures - Late Stone Age, New Stone Age and Iron Age. These three cultures can be correlated to Pre-Neolithic Period (Palavoy I), Neolithic Period (Palavoy II) and Post-Neolithic Period (Palavoy III) discerned in the Neolithic and ashmound excavations at Palavoy in Anantapur district.

The earliest human relics were found in the form of a deeply patinated basaltic flake industry confined to the lowermost portion of layer 14 exhibiting Levallois type technique. The flakes of this industry antedated the Late Stone Age Culture.

The Late Stone Age culture is known from the surface of several sites in our region. On the basis of our evidence from the upper portion of layer 14 in the Palavoy excavations we can say that this culture is chronologically anterior to the Neolithic Culture of the region. The number of sites is too small to know the full distribution of this culture in the region.

Both patinated flake industry and microlithic industry are strikingly similar to those found at Sanganakallu near the town of Bellary.

The Neolithic Culture is fairly wide-spread in the region, particularly in the west and southwest parts touching the Karnataka state. This culture is represented in layers 11 to 9 in Palavoy excavations. There is no direct proof to say that this culture has directly and immediately succeeded that of the Late Stone Age because in the excavations at Palavoy we found a stratigraphical break of sterile layers between this (Palavoy II) and the Pre-Neolithic Period (Palavoy I). The only radiocarbon date availably for the late level of this culture is 1965 B.C. To know whether the people of this culture have come from outside, or developed from the indigenous foodgathering-cum-collecting-cum-hunting communities, only intensive explorations and large scale excavations of a number of undisturbed settlement sites and the study and analysis of their results in relation to the life of the primitive tribes and rural societies would be of supreme importance at the moment.

The Iron Age remains have been found to be extensive in the region. There is a sudden follow up of this culture with that of the Neolithic. The period is represented in layers 8 to 2 in ashmound excavations at Palavoy. On the basis of the archaeological finds from the excavations at Palavoy, we hold the view that the cause or causes for the formation of vitrified ash deposits lay in the activity of iron-smelting by Post-Neolithic communities.

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Pre and Protohistoric Settlement Pattern of the Middle and Lower Ganga Valley

M.M. Hoque

This study deals with all available records from explorations, excavations, laboratory studies, and absolute dates, relating to settlement patterns of prehistoric and protohistoric cultures of the Middle and Lower Ganga Valley. All gathered information has been analysed and synthesised with reference to environmental parameters like landscape, soils, climate, water sources flora and fauna. The picture of the spatial and temporal distribution of prehistoric and protohistoric settlements that emerges from this study can be summarised as follows.

Middle Ganga Valley

The alluvial plain of the Middle Ganga Valley is a homogeneous, level, featureless plain from one end to the other. Physically, it is divided into six sub-regions: a) Ganga-Gharhra doab, b) Saryupar plain, c) Mithila plain, d) Kosi plain, e) Ganga-Son divide, and f) Anga-Magadh plain (Singh 1972; Spate *et al.* 1967). Climatically, the entire region is sub-humid, the annual rainfall being 1000 to 1220 mm, except in Gorakhpur district of U.P. and Champaran and Purnea districts of Bihar where it exceeds 1500 mm. The soil is fertile and good for cultivation. The region is rich in floral and faunal resources. The chief species of trees found in the area are *dhak (Butea frondosa), shisham (Dalbergia sissoo), nim (Azadirachta indica), babul (Acacia arabica), bel (Aegle narmelos), peepal (Ficus religiosa), simul (Bombax ceiba), mahua (Madhuca indica) and arjun (Terminalia arjuna)*. The wild animals that still remain, despite heavy deforestations, are tiger (*Panthera tigris)*, leopard *(Panthera pardus)*, wolf *(Canis lipus)*, Hyena *(Hyaena hyaena)*, jackal *(Canis aureus)*, fox *(Vulpes bengalensis)*, bear *(Melursus ursinus)*, boar *(Sus scrofa)*, sambar *(Cervus unicolour)*, chital *(Axis axis)*, blackbuck *(Antelope cervicapra)*, nilgai *(Boselaphus trago camelus)* and mongoose *(Harpestes edwardsi)*.

The geographical distribution of pre and protohistoric sites of the region is given in Table 1.

Table 1: Geographical distribution of pre and protohistoric sites of the Middle Ganga Valley.

Sub-regions	**Upper/ Epi-Palaeolithic**	**Mesolithic**	**Neolithic**	**Chalcolithic**	**Total**
	No %	No %	No %	No %	No %
Ganga-Ghaghra Doab	6 100.00	202 93.52	- -	45 33.58	253 68.19
Saryupar Plain	- -	1 0.46	2 13.33	43 32.09	46 12.40
Mithila Plain	- -	- -	1 6.67	1 0.75	2 0.54
Kosi Plain	- -	- -	- -	- -	- -
Ganga Plain North Total	6 100.00	203 93.98	3 20.00	89 66.42	301 81.13
Ganga-Son Divide	- -	1 0.46	7 46.67	34 25.37	42 11.32
Anga-Magadh Plain	- -	12 5.56	5 33.58	11 8.21	28 7.55
Ganga Plain South Total	- -	13 6.02	12 80.00	45 33.58	70 18.87
Grand Total	6 100.00	216 100.00	15 100.00	134 100.00	371 100.00

Table 1 shows that though the Kosi plain of the Ganga plain north was not occupied by human groups till the Chalcolithic period, perhaps due to its ecologically unfavourable situation, the rest of the Ganga plain north was favourable for human occupation. Of the total number of 371 sites, as many as 301 (81.13%) are located in the Ganga plain north while only 70 (18.87%) are located in the Ganga plain south. The only difference in this pattern is seen during the Neolithic period when three sites are located to the north and 12 to the south of the Ganga. The reason for this difference can be found only after further investigation.

Lower and Middle Palaeolithic sites are absent in the Ganga plain. Palaeolithic man probably did not colonise the region because it lacked the essential raw material- stone- for his technology, and because it may have been too marshy. A number of Palaeolithic sites are, however, reported in the Vindhyan region, south of the Ganga plain, in the valleys of the Balia *Nadi*, Tons, Belan and Seoti rivers, and their affluents like the Lapari, Lohanda,

Yogiya, Nadoh, Balluhawa and Bharuhawa nullaha in Allahabad and Mirzapur districts.

Human colonization of the plain began at the end of the Pleistocene as is suggested by the discovery of six Upper Palaeolithic or Epi-Palaeolithic sites. The discovery of 216 Mesolithic sites on the plain suggests considerable intensification of the process of human colonisation during the early Holocene. This colonization would have been possible only through the migration of the people from the Vindhyan hills northward across the Ganga river.

The salient features of the pre and protohistoric cultures of the region are as follows:

The Epi-Palaeolithic sites (6) are sporadically distributed in the Ganga-Ghaghra sub-region and they are located on lake shores (3) and banks of small rivers (3) (Sharma *et al.* 1980). The cultural material is represented by only stone artefacts which occur in the upper most part of the *Bhangar* or older alluvium. The stone artifacts comprise parallel-sided blades, blunted-back blades, lunates, points, scrapers, burins, borers, cores, flakes and debitage. The tools are generally in fresh condition with occasional patination. The presence of artifacts in different stages of manufacture suggests that they were manufactured at the sites. Raw materials used for making tools are chert, chalcedony, agate and quartz.

There is no stone available in the Ganga plain and hence the raw material had to be imported from the Vindhyan hills south of the Ganga river, about 100 km away from the sites. For this reason the raw material had to be used most economically. The size of artifacts is smaller than that on the sites of the Vindhyan hills.

A total of 216 Mesolithic sites have been reported in the region. Of these, 203 (93.98%) are located in the Ganga plain north and 13 (6.02%) in the south. The sites are mainly concentrated in the Ganga-Ghaghra doab (202). Outside this sub-region only a few sites are found: Anga-Magadh plain (12), Saryupar plain (1) and Ganga-Son divide (1). Mesolithic people selected two types of water sources for their settlement: a) lake shores, and b) river valleys. Of the 216 sites, as many as 193 are located on lake shores and 23 on river banks. The lake-associated settlements are found in the Ganga-Ghaghra sub-region while riverbank settlements are distributed in all four sub-regions. The sites located on lakes are found in the topmost formation of loose and sandy earth of *Bhangar* which covers upland tracts of the plain beyond the annual flood limit in the area. The selection of sites on the lake shores suggests that the settlers had in mind an assured supply of water and aquatic food resources.

The reason for the smaller number of sites on river banks is not clear. It is possible that some of the river banks sites may have got buried under alluvium or washed away by shifting river channels. During the rainy season the level of water in the rivers is unpredictable. Very often floods occur in the plain areas when the rivers receive more discharge due to heavy rainfall in their catchments areas. Probably due to flood factor river banks were not suitable places for habitation.

Data on the size and spacing of the sites is available only for Pratapgarh district (Pandey 1990a, 1990b). Mesolithic sites are generally small in size, most of them measuring between 4.5 sq m and 5 sq m in area. There are a few large sites such as Sarai-Nahar-Rai (1800 sq m), Mahadaha (8000 sq m) and Damdama (8750 sq m). Average spacing between two sites is between 5 and 10 km in Pratapgarh district and slightly more in other districts.

The technology during Mesolithic period comprises microlithic industry, ground stone objects, and bone and antler implements (Sharma 1973; Varma *et al.* 1985; Pal 1987). The microlithic industry includes finished tools, cores, flakes and other debitage (chips, worked nodules). The finished tools are divided into two groups: microliths and other tools. Microliths can be further grouped into two: a) non-geometric, and b) geometric. Non-geometric microliths include retouched blades, backed blades, truncated blades, backed and truncated blades, notched blades, points, arrow-heads and lunates, while geometric microliths comprise triangle, trapezes and trapezoids.

The ground stone industry comprises food processing implements like querns, mullers and muller-cum-anvils, and tools manufacturing implements comprise anvils, hammer stones, sharpeners, and retouchers, and hunting implements consists of sling balls.

Since stone was accessible only with difficulty in the area, Mesolithic populations used bone and antler as a supplement of stone. Bone and antler tools include pokers, daggers, arrow-heads, points, blades, knives, chisels, axes, scrapers, saws, and cutting lancets. Besides, a few horn cores of sheep-goat and deer antlers were also found which could be used for digging purposes. Some of the implements show shining surfaces, probably caused by their extensive use. The evidence of blunting and sharpening is also discernible, particularly in the case of blades and knives. The working edges of some of the implements are retouched while in some other cases they are serrated.

The subsistence economy of the Mesolithic people consisted of hunting, gathering, fishing and fowling. They hunted wild cattle, buffalo, gaur, sheep/goat, pig, antelope and deer. The presence of bones of bird, tortoise, fish and snail suggest their fishing and fowling activities. The food grains found at Damdama comprise rice and millet which suggesting that these cereals grew wild in the area.

They prepared simple huts with hearths. A floor of a hut at Sarai-Nahar-Rai was littered with burnt clay lumps and animal bones, and was enclosed by "U-shaped" four post-holes forming an irregular rectangle. A shallow depression had been made from both the ends of the floor. The floor of huts at Damdama was plastered with yellow natural soil.

The hearths are, generally, circular or oval in shape but an irregular hexagonal shaped hearth is also found at Sarai-Nahar-Rai. Some of the hearths are plastered with fine clay at the bottom and sides. The thickness of plaster varies from 2.5 cm to 3 cm. In some cases multiple layers of plastering are noticed. One community hearth enclosed by four post-holes and subsequently covered by a circular floor paved with burnt clay lumps was found at Sarai-Nahar-Rai. Besides, a few plastered pits are noticed at Damdama, which may be storage pits for storing wild grains and seeds (Sharma 1973; Varma *et al.* 1985).

The people manufactured a variety of ornaments of bone, ivory and antler. They comprise rings, ear-rings, necklaces, pendants, bangles and beads.

The Mesolithic people buried their dead within the settlement. The burials are of two categories: a) extended, and b) flexed. The skeletons are, generally, oriented in west-east or east-west direction, though in a few cases some variations have also been observed. The sun may have guided the true west-east or east-west direction of skeletons, and the variations in orientation may be attributed to the shifting position of the sun during the year. On the basis of number of skeletons in a grave the burials can be divided into three categories: a) single, b) double, and c) multiple. In the cases of double and multiple burials equal number of male and female were buried together in one grave. An exception is found only at Damdama where two males and one female were buried in one grave. A few burial goods such as microliths, shell objects, bone tools, ornaments and animal bones are found in the burials, which suggest the ritual beliefs of the people (Sharma 1973; Pandey 1990a; Pal 1992; Varma 1984).

The chronology of the Mesolithic culture in the region is still not clear. On the basis of C-14 dates and on typo-technological considerations time span of this culture can be tentatively assigned circa 8000 to 2000 B.C. (Agrawal and Kusumgar 1974; Varma 1986).

The Neolithic sites in the region are very few (15) and are sporadically distributed in the Saryupar plain (2) and Mithila plain (1) of the Ganga plain north, and the Ganga-Son divide (7) and Anga-Magadh plain (5) of the Ganga plain south. The sites of Ganga plain north are liable to flooding while sites of the Ganga plain south are located beyond the annual flood limit. The location of sites in the flooding area seems to be dictated by the availability of rich alluvium for cultivation.

The technology comprises of the Neolithic people are ground stone tools and stone objects, blade and microlithic industry, and bone and antler tools (Sharma *et al.* 1980; Narain 1972). The main occupation was agriculture and domestication of animals but they also practiced hunting, fishing and fowling. They cultivated rice, wheat, barley, lintel (*moong, masoor)*, field pea and millet and domesticated sheep/goat and cattle.

They lived in circular or semi-circular huts, which had oblong hearths. The ceramic industry comprises cord-impressed ware, rusticated ware, plain red ware, plain grey ware, black ware, burnished red ware, burnished grey ware and black-and-red ware. The ornaments consist of beads, ear-rings, pendants and bangles. They are

made of different materials like stone, bone, shell and terracotta. Besides, terracotta human, animal and bird figurines, a few miscellaneous objects are also present in the Neolithic phase. On the basis of C-14 dates the chronology of the Neolithic culture can be assigned to the period from first half of the third millennium B.C. or little earlier to the beginning of the second millennium B.C. (Agrawal and Kusumgar 1974; Pal 1986; Possehl 1988; Sharma *et al.* 1980; Singh 1990).

The Chalcolithic sites (134) are widely distributed in the Ganga-Ghaghra doab (45), Saryupar plain (43) and Mithila plain (1) of the Gnaga plain north, and the Ganga-Son divide (34) and Anga-Magadh plain (11) of the Ganga palin south. Sites are densely concentrated in the Ganga –Ghaghra doab, Saryupar plain and Ganga-Son divide. The selection of sites seems to have depended largely upon topographic situation. Sites are found below 90 m contour line and are located on higher *Bhangar* land, above the flood level. All of them are located along the river banks. This choice seems to have been determined by the sufficient availability of water, land for cultivation of crops and grazing of animals, and aquatic creatures for subsistence. The Chalcolithic settlements are located in a linear fashion.

Copper implements such as flattened bar celt, arrow-head, fish-hook and miniature bell were introduced during this period. The other implements are bone tools, ground stone tools and objects, microliths, and terracotta pipes possibly used in fishing nets, and balls. The people cultivated rice, wheat, barley, millet, *moong*, *masoor,* field-pea gram/chick pea, green gram, horse gram, lentil, mustard, linseed, *til* (oil seed) and cotton. Besides agriculture, they bred cattle, buffalo, sheep/goat and pig. They also hunted wild species like cervids, antelope and gazelle. The presence of a few bones of bird, tortoise and fish suggest that they also practiced fishing and fowling.

Their houses were circular in shape and had hearths for cooking. The principal ceramic was black-and-red ware. Other associated wares were: red ware, black-slipped ware, black ware, grey ware, cord-impressed ware and rusticated ware. The ornaments comprise beads, bangles, ear-rings, wires and pendants. These were made of stone, bone, shell, copper, gold and terracotta. The other material remains are terracotta figurines of human, animal and bird, gamesmen and potter's objects. Burials comprise pit burials, cairn circles, cists and cists within cairn. Burial goods consist of ceramics, beads, microliths, bangles and animal bones. On the basis of C-14 dates, the chronology of this period can be assigned from circa 1900 B.C. to 700 B.C.

The Lower Ganga Valley

The Lower Ganga Valley is an area of 2,07,000 square kilometers covering deltaic parts of West Bengal and Bangladesh. The entire area is divided into five sub-regions: a) The sub-montane terai, here known as the Duars, b) The northern Paradelta, or the Ganga-Brahmaputra Doab and the Barind, c) The eastern margins, d) *Rarh* Plain or the Western Margins of the Delta, e) The Ganga Delta proper. The geological formation of the region is divided into two: the older alluvium of the Pleistocene, containing clay and silt, sometimes associated with pebbles and gravels and newer alluvium which occurs mainly in the deltaic area, and is characterised by the old mud, new mud and marshes (Singh 1972; Spate *et al.* 1967). Climatically, the region is humid. The annual average rainfall is 1440 mm in the delta proper and the *rarh* plain, and 3130 mm and above in the eastern margins and north Bengal plain. The region is rich in floral and faunal resources. The principal trees in the region are *sal* (*Shorea robusta), mahua (Madhuca indica), palas (Butea monosperma), kusum (Scleichera oleosa)* and clumps of bamboo (*Dentrocalamus strictus*). Of the wild fauna that still remains are tiger, leopard, wolf, hyena, jackal, fox, bear, boar, sambar, spotted deer, barking deer, ravine deer and various species of birds, fishes and reptiles.

Table 2: Distribution of Pre and Protohistoric Sites in the Lower Ganga Valley.

Sub-region	Lower Palaelithic	Middle Palaeolithic	Upper Palaeolithic	Mesolithic	Neolithic	Chalcolithic	Total
	No. %	No. %	No. %	No. %	No. %	No. %	No. %
Birbhum-Asansol *Rarh*	4 8.16	8 19.51	1 10.00	56 26.92	4 4.04	37 51.39	110 22.96
Bankura *Rarh*	16 32.65	19 46.34	4 40.00	86 41.35	15 15.15	8 11.11	148 30.90

Midnapur *Rarh*	27 55.10	13 31.71	5 50.00	60 28.85	52 52.53	2 2.78	159 33.19
Rarh Total	47 95.91	40 97.56	10 100.00	202 97.12	71 71.72	47 65.28	417 87.06
Moriband Delta	1 2.04	-- --	-- --	1 0.48	1 1.01	1 1.39	4 0.84
Mature Delta	-- --	-- --	-- --	4 1.92	3 3.03	24 33.33	31 6.47
Active Delta	1 2.04	-- --	-- --	1 0.48	2 2.02	-- --	5 1.04
Delta Total	2 4.08	1 2.44	-- --	6 2.88	6 6.06	25 34.72	40 8.35
Duars	-- --	-- --	-- --	-- --	6 6.06	-- --	6 1.25
Barind Tract	-- --	-- --	-- --	-- --	1 1.01	-- --	1 0.21
North Bengal Plain Total	-- --	-- --	-- --	-- --	7 7.07	-- --	7 1.46
Eastern Margins	-- --	-- --	-- --	-- --	15 15.15	-- --	15 3.13
Grand Total	49 99.99	41 100.00	10 100.00	208 100.00	99 100.00	72 100.00	479 100.00

Table 2 shows that the ecological setting of the *rarh* plain was more favourable for human occupation than the other three sub-regions. Of the total 479 pre and protohistoric sites in the Bengal Delta, as many as 417 (87.06%) are located in the *rarh* plain and remaining sites sporadically distributed in all other sub-regions. The North Bengal and Eastern Margins were colonised by man only during Neolithic period. The salient features of pre and protohistoric cultures in Lower Ganga Valley are as follows:

The evidence of human occupation in the region can be traced back to the Lower Palaeolithic period. Of the reported 49 Lower Palaeolithic sites 47 (95.91%) are located in the *rarh* plain (27 in Midnapur *rarh*, 16 in Bankura *rarh* and 4 in Birbhum-Asansol *rarh*) and two in the delta proper (one in Moriband and other one is in Active Delta). Sites are clustered in the Midnapur and Bankura *rarh* in the Valleys of the Tarapheni, Kansabati, Kumari and Suvarnarakeha. The tools, which have been used by the Lower Palaeolithic man for subsistence activities are choppers, chopping tools, handaxes, cleavers, scrapers, discoids and points, and these all were made of locally available raw materials like quartz, quartzite and fossilwood (Datta1991; Ghosh 1966; Ghosh and Chaudhuri 1991).

Of the 41 Middle Palaeolithic sites, as many as 40 (97.56%) sites are located in the *rarh* plain (19 in Bankura *rarh*, 13 in Midnapur *rarh* and eight in Birbhum-Asansol *rarh*) and one in delta proper (Active delta). Sites are found clustered in the Bankura and Midnapur *rarh*. The industry of Middle Palaeolithic man comprises scrapers, points, borers and flakes. Raw materials used for manufacturing tools are mostly quartz and quartzite though some fossil wood tools are also found (Ray 1991; Chakrabarti and Chattopadhyay 1984).

The Upper Palaeolithic sites are very few. Only 10 sites have been reported in the region. The reason for few sites in the area can be explained only after further investigation. All sites are found in the *rarh* plain (five are in Midnapur *rarh*, four in Bankura *rarh* and one in Birbhum-Asansol *rarh*). The artefacts consist of points, lunates, scrapers, borers, burins, spearheads, choppers, blades, flakes and cores. The raw materials used by the Upper Palaeolithic man for making tools are green quartzite, quartz, cherty quartz, chert, sandstone and basalt (Datta and Ray 1989; Chakrabarti and Chattopadhyay 1984).

Of the 208 Mesolithic sites, as many as 202 (97.12%) sites are located in the *rarh* plain (86 in Bankura *rarh*, 60 in Midnapur *rarh* and 56 in Birbhum-Asansol *rarh*) and six (2.88%) in the delta proper. In the delta proper sites occur sporadically while in the *rarh* plain they are found clustered in the valleys of the Suvarnarekha, Dulung and Tarapheni in the Midnapur *rarh*, of the Kansabati, Kumari, Silawati, Ujani and Gandheswari in the Bankura *rarh*, and of the Damodar, Kunoor, Ajay, Sal, Kopai and Bakreswar in the Birbhum-Asansol *rarh*. The lithic industry of the Mesolithic culture in Lower Ganga Valley is essentially non-geometric and comprises retouched blades, backed blades, serrated blades, points, lunates, scrapers, burins, blades, flakes, cores and debitage. They are made of locally available materials like chert, chalcedony, agate, quartz, quartzite, crystal, basalt and fossil wood. The Mesolithic people of the region built circular huts at their settlements. The stratigraphy and typo-technology of Mesolithic tools suggest that circa 4000 BC or even earlier time Mesolithic

occupation took place in this ecological niche (Bhattacharya *et al.* 1978-79; Chakrabarti *et al.* 1982; Datta *et al.* 1984; Lal 1958).

Neolithic occupation in Lower Ganga Valley is less but widely distributed in all over landscape. Of the 99 Neolithic sites, as many as 71 (71.72%) are located in the *rarh* plain (52 in Midnapur *rarh*, 15 in Bankura *rarh* and four in Birbhum-Asansol *rarh*) 15 (15.15%) in the Eastern Margins, 7 (7.07%) in the North-Bengal plain (six in Duars and one in Barind tract) and 6 (6.06%) in the delta proper (four in Mature delta and one each in Moriband and active delta). The sites can be grouped into two categories: cluster occurrence and sporadic occurrence. The former type is found in the valleys of the Suvarnarekha and Tarapheni rivers of Midnapur *rarh*, on the Gandheswari river of the Bankura *rarh* and on the Gungiajurichara of the Eastern Margins. Floods may have been a major factor in the selection of sites for settlement. Distribution of sites suggests that 97 (97.98%) sites are located above the flood-prone zone. Larger number of site (71) in the *rarh* plain is probably because of the easy availability of raw material for making tools and wild flora and faunal resources for subsistence. The presence of sites in the whole delta indicates that the Neolithic population extensively and more effectively colonised the region than by the Palaeolithic and Mesolithic people. Except for a small number of potsherds and ground stone tools no other material is found at these sites. Therefore, it is not possible to say much about the micro-settlement and subsistence strategies of the Neolithic people. On the basis of C-14 dates of Bihar Neolithic phase and comparative study in Bengal and North-East Indian Neolithic sites, Neolithic phase of the Lower Ganga Plain can be placed between circa third millennium B.C. and third/second century B.C. (Chakrabarit 1992; Ghosh 1970; Goswami 1984; Hoque *et al.* 1998)

Out of 72 Chalcolithic sites, 47 (65.28%) are found in the *rarh* plain (37 in Birbhum-Asansol *rarh*, eight in Bankura *rarh* and two in Midnapur *rarh*) and 25 (34.72%) in the delta proper (24 in Mature delta and one in Moriband delta). Sites are grouped into two categories: a) cluster occurrence; and b) sporadic occurrence. The clustered sites are found in the Birbhum-Asansol *rarh* in the valleys of the Bakreswar, Ajay and Sal, and in the Mature delta in the valleys of the Damodar, Kunoor and Khar. The selection of a site for settlement during Chalcolithic period seems to have depended largely upon topographic situation. They are located roughly below 50m contour line and along the river banks, suggesting consideration of adequate availability of water, land for cultivation and grazing, and of aquatic creatures. In the Birbhum-Asansol *rarh* sites are located at a distance of 5km from each other. The settlements generally cover not more than 4 to 6 acres of land and their general arrangment is linear. Modest thatched huts — 10 to 12 in number — are seemingly in ‘chaotic agglomeration’.

During the Chalcolithic period copper implements such as celts and fishhooks were used. Other implements include ground stone tools and other objects, bone tools and terracotta objects. It is evident that Chalcolithic people cultivated rice and domesticated cattle, buffalo, sheep/goat and pig. Beside cultivation and domestication, hunting and fishing were also part of their life. They hunted deer, jungle fowl and wild pig. The remains of tortoise and fresh water fish bones suggest that they also procured their subsistence by fishing.

The ceramic industry of this period comprises black-and-red ware, red ware, black slipped ware, black ware, red slipped ware, buff ware and lustrous red ware. Ornaments include beads, bangles, rings and wires, which all were made of copper, stone, bone, shell and terracotta. The Chalcolithic people of the region adopted a culture to bury their dead. The burials pattern of the people consist of primary or extended, secondary or fractional and urn burials Chakrabarti and Hasan 1982; Dasgupta 1964;Ghosh and Nag 1986). On the basis of C-14 dates the Chalcolithic phase in the region can be placed between circa mid-second millennium BC and the later half of the first millennium BC.[*]

[*] [*] Datas available till 1993 are only included in this paper

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From Archaeology of Indo-Roman Trade to Indian Ocean Archaeology

Sunil Gupta

Abstract

I registered for doctoral studies at the Deccan College in 1991 under V.N. Misra. The topic for the Ph.D. was 'From Roman Egypt to Peninsular India: Archaeological Patterns of Trade, 1st century BC to 3rd century AD' I successfully defended my thesis in 1998. This paper focuses upon my basic interest in Indo-Roman sea trade and the broadening of this interest to the early Indian Ocean world in the post-doctoral phase. The paper is divided into two parts. In the first part I have reproduced part of the abstract of my Phd thesis submitted to the University of Pune. The second part of the paper outlines the Indo-Roman theme within an 'archaeology of trade' paradigm. The paper shows how the Indo-Roman episode, being 'pan-oceanic' in its reach, offers the best entry points into understanding the complex Indian Ocean interaction sphere.

Part I: Abstract of Ph.D. thesis.

This thesis has been conceived within the historiographical framework of early maritime trade in the Indian Ocean. In specific terms the present work attempts to reconstruct, primarily from archaeological evidence, aspects of sea borne commerce between India and the Roman Empire. This theme is reflected in the title of the thesis: Roman Egypt to Peninsular India: Archaeological Patterns of Trade, 1st century BC to 3rd century AD.

In this thesis the attempt is to interpret, empirically and conceptually, the substantial archaeological data which has emerged from prospections in India and Indian Ocean lands. Though this work focuses upon the commercial relationship between the Roman Empire and India, the discussions endeavour to explore the 'wider' dimensions of the Indo-Roman connection. In other words, this thesis tries to situate the archaeology of Indo-Roman sea trade within the larger historic backdrop of early maritime trade in the Indian Ocean.

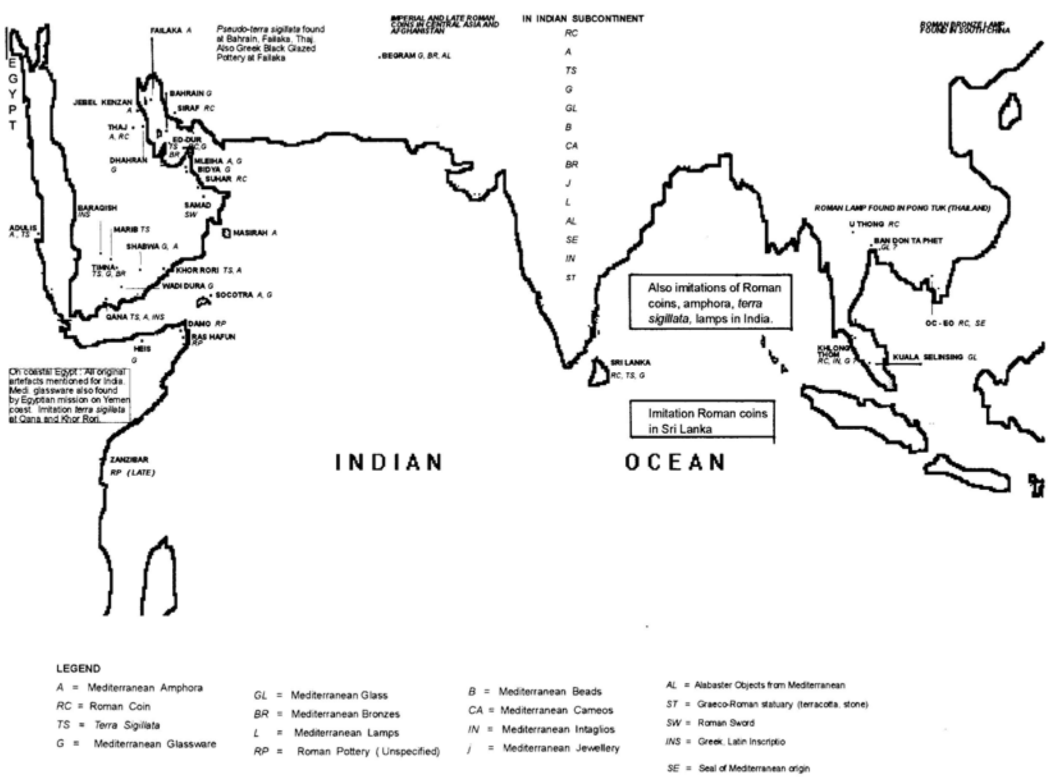


Fig. 1: Distribution of Mediterranean artefacts across the Red sea-northern Indian ocean in early historic time

Part II: From Indo-Roman to the Indian Ocean interaction sphere.

In the beginning of the Christian Era, the vast expanse of the northern Indian Ocean had become a reality for the Mediterranean World. By this time, mariners from the Roman Empire were voyaging across a considerable part of the seas they knew as the *Erythra Thalassa*.[1] The Indian Ocean, from the Red Sea to the shores of the South China Sea, had opened to trade from the west. The monsoons, wind systems that define the environment of this maritime space, were crucial to the growth of deep sea networks. Of course, all of this was not without precedent. The littoral regions of the Indian Ocean had witnessed prehistoric migrations, dispersals of flora and fauna, emergence of some of the greatest civilizations (Mesopotamia, Indus, Southern Arabia), development of maritime technologies and spread of trade networks (Fig. 1). The First Maritime Tradition in the Indian Ocean is signified by two major episodes of sea trade in the 3rd-2nd millennium BC: the Harappan - Mesopotamian interchange across the northern Arabian Sea and the trade between Pharaonic Egypt and the myrrh producing land of Punt near the southern Red Sea.[2] These engagements led to the first trade ports of the Indian Ocean to be founded.[3] A millennium later, the revived Iron Age networks ushered in the Second Maritime Tradition in the Indian Ocean.[4] On the Indian seaboard, harbours re-emerged nearly a thousand years after the Harappan ports had faded into obscurity. In the Persian Gulf region, we find Iron Age coastal settlements situated in close vicinity of the Copper-Bronze Age sites. In Island Southeast Asia, the Early Iron Age settlements begin to yield beads of Indic origin in the last centuries BC, indicating the first voyages across the Bay of Bengal. The close of the 1st millennium BC saw increasing contacts between various littoral regions of the Indian Ocean, primarily due to the spreading knowledge of the monsoons and development of maritime technologies.

The opening of the Red Sea route to India during the BC-AD transition was an important event in the integration of the Indian Ocean world. This corridor was the maritime complement of the overland Silk Route emerging out of Central Asia, traversing the Iranian highlands to the Mediterranean world. The Silk Route of the Sea opened because of the Roman - Parthian conflicts (that disrupted flow of goods along the overland conduits) and the Roman conquest of Ptolemaic Egypt in 30 BC The annexation of Egypt to the empire expanded the Roman frontiers to the Red Sea and opened new commercial possibilities for trade with Early Historic India and Indian Ocean lands.

Review of Literature: Indo-Roman to Indian Ocean Studies

The historical discourse on early maritime contact between the Mediterranean World and India has its own long tradition. To trace the evolution of studies in long distance Mediterranean sea trade with the Orient we have to go back to the 15-16th century when the first editions of ancient Greco-Roman works of geography were prepared from surviving manuscripts and published. This was the time when Europe was engaged in a major maritime quest to the east: to discover the long sea route to India by circumnavigating Africa. Columbus, seeking to discover a new western route to India, came upon America in 1492. Vasco Da Gama successfully rounded the Cape of Good Hope to reach Calicut in 1497. In this context, the

[1] Sidebotham (1986a: 1) clarifies the meaning of the terms: 'The common translation is simply Red Sea. However, it is clear that the terms could refer equally to the Persian Gulf, the Indian Ocean or the Red Sea as we call it today'.

[2] For Harrapan-Gulf trade see Ratnagar 1981; Chakrabarti 1990; Cleuziou and Tosi 1989: 134-161; Cleuziou 1992: 93-103; Shahani 1996. For the Egypt-Punt trade see Sayed 1977: 140-178; Kitchen 1993; Gupta 2002: 1-24.

[3] The important Bronze Age harbours that were established in the northern Indian Ocean rim are: the Pharaonic (early 2nd millennium BC) harbour of Wadi Gawasis on the Egyptian Red Sea coast (Sayed 1977: 140-178); Ur, Bahrain and Umm al Nar in the upper, middle and lower Gulf respectively (Potts 1990); the Harappan ports of Suktagendor in the Makran, Balakot in Sind, Lothal and Kuntasi on the western Indian seaboard (Poesshl 1999).

[4] The Iron Age begins in most parts of the Indian Ocean world in early - mid 1st millennium BC In the Red Sea region iron manufacturing was taking place in the ancient Nubian kingdom of Meroe around 500 BC (Shinnie 1996: 320-23). In south Arabia/Gulf of Aden littoral, the Iron Age is well established in early 1st millennium BC, reflected in the rise of fortified settlements like Marib (Al Ansary 1996: 243; de Maigret 1984, 1985). In eastern Africa, Chami (2002) dates Early Iron Working cultures to 4th/3rd century BC. In the Persian Gulf region the rise of the Iranian tribes in the 7th century BC and the coming to power of the Achaemenids is congruent with the Iron Age in the upper Gulf. In the middle-lower Gulf the site of Qalat al Bahrain reveals an iron age sequence in broadly the same period (Potts 1990, Vol. II). In the Indian subcontinent the early Iron Age in northern India is signified by the Painted Grey Ware (PGW) dated from 1200 to 500 BC In peninsular India, the Black and Red Ware culture, identified mainly with Megalithic sites, is associated with the Iron Age. The early iron ge site of Hallur is dated to 1000 BC by radiocarbon (Ghosh 1989). In Southeast Asia the Iron manufacturing is apppears 600 –500 BC (Bellwood 1992: 129-30).

resuscitation of ancient Hellenic knowledge of Oriental lands, especially India, was in keeping with the mood and spirit of the times.

The *Geographia* of Claudius Ptolemy, a cartographic representation of the ancient world constructed in 2nd century AD. Egypt was the first major work of Hellenic geography to be printed in 1477 (Gole 1983: 25-30). The *Geographia* provides a detailed map of the Indian Subcontinent which includes the locations of coastal and inland settlements, names of rivers, river-mouths/deltas, mountains, coastal tracts and gulfs. Ptolemy set down the co-ordinates of all these places. Though Ptolemy's map of India is irrelevant for modern cartography (the shape of the subcontinent being highly distorted), it is still a goldmine of information for historical geographers (for review of Ptolemy's map see Gole 1983: 25-30).

The first editions of the Greek sea guide, the *Periplus Maris Erythraei* were printed in the 16th century in Italy. The Periplus, as this work is commonly known among historians and archaeologists in the field, is a manual for sailors written in Greek by an anonymous mariner in the first century AD. There were quick succeeding editions in the same century (Schoff 1912/74: 17). In 1507 was discovered a medieval period copy of the Roman map of the world made in the 4th century AD. The discovery was made public in 1511. The map was printed in 1598 by the Hapsburg Chancellor, Konrad Peutinger. The *Tabula Peutingeriana* or Peutinger Tables, as this ancient map is called, contains a section on India (again highly distorted) providing locations of towns, rivers and physical features.

The publication of ancient Greco-Roman geographical accounts of the East fuelled a scholarship which carries on unabated. A number of translations of the *Periplus* and the *Geographia*, many of them appended with critical commentaries, were undertaken in the subsequent centuries. A few of the notable translations/commentaries are those by J.W. McCrindle (1879), W.H. Schoff (1912), G.B.W. Huntingford (1980) and L.Casson (1989). A detailed translation of the section of Ptolemy's *Geographia* relating to India has been done by J.W. McCrindle (1884: 313-427). The place names in Southeast Asia mentioned in the Geographia have been most thoroughly studied by Gerini (1909).

Concommitant with the preparation of critical translations of the *Periplus* and *Geographia* was the emergence of a sub-stream of studies on the historical geography of India based on the data contained in these two books. Very simply the imperative here was to locate, by identifying place names on latest maps or through actual exploration, the settlements (especially ports) detailed in the *Periplus* and the *Geographia*. Of course, geographical references from other contemporaneous Roman and Indian texts were also taken into account. These parallel sources are the *Indika* of Megasthenes (4th century BC), *Geographia* of Strabo (1st century AD), the *Natural History* of Pliny (1st century AD), the Buddhist *Jatakas* stories and early Tamil poetry.

The first efforts towards identification of Indian settlements mentioned in the *Geographia* and other contemporary Roman and Indian works was made by F. Wilford in a series of articles published in the *Asiatick Researches* between 1794 to 1822. Christian Lassen in his monumental work *Indische Alterthumskunde* attempted a similar, and more comprehensive survey. This work was compiled between 1847-53. To illustrate Lassen's book, Henri Kiepert published the *Map of Ancient India with the Indian, classical and principal Modern Names* in 1853. The next major contribution was that of the French historian, M. Vivien de Saint-Martin, whose study *Etude sur la geographie Grecque et Latine d'Inde* published in 1860 with a special focus on the evidence of the *Geographia*, became a source-book for historical cartographers and explorers. Among the first fieldworkers to survey for sites of the *Periplus-Geographia* was Alexander Cunningham who published the *Ancient Geography of India* in 1871. In 1874, Henry Yule published his *Map of Ancient India*, mainly drawing from Saint-Martin's work. We may mention also the survey on the western coast of India carried out by Fergusson and Burgess in the 1870s who made claim to discovering a few settlements mentioned in Greco-Roman accounts. J.W. McCrindle published his translations of the *Periplus* and *Geographia* in the 1879 and 1884 editions of the *Indian Antiquary*. McCrindle's commentaries became the basic source on India for the later critical editions of the Periplus prepared by W.H. Schoff (1912), Huntingford (1980) and Casson (1989). In context of major works of historical geography focusing on Hellenic texts, we may also mention the detailed account of Nundolal

Dey (1921) to precise the locations of the mouths of the Ganga mentioned in the *Geographia*.

By the beginning of the present century substantial primary records had accumulated for historical reconstruction of early Indo-Mediterranean contact to be possible. Besides the publication of old Greco-Roman geographical and travel accounts and their informative corollaries, there were also now available material finds of long distance Roman maritime trade with India. The main artefactual indicators of trade were the Roman coins and coin hoards being regularly discovered across the peninsular India since 1787 (for first Roman coin find see Davis 1794/1979: 259-260; for discoveries in 19-20th centuries see list of Sewell and Wheeler *et al*. (1946: 116-121).

Among the first histories of Indo-Roman trade to be written was *Intercourse between India and the Western World* by H.G. Rawlinson (1916). A few years earlier Radhakumud Mookerji (1912) had published his seminal *work A History of Indian Shipping and Maritime Activity from the Earliest Times*. Mookerji's book records critical references to early contact with the Roman empire in Indian textual sources. The first reconstuction with main focus on Indo-Roman sea trade (as contrasted with overland trade) was undertaken by E.H. Warmington (1928) in *The Commerce between the Roman Empire and India*. After Warmington, Charlesworth (1951) was to make his contribution to studies of Indo-Roman trade in his book *Trade Routes and Commerce of the Roman Empire*. A seminal contribution to the understanding of Roman sea commerce with India was made with the publication of the report on excavations at the site of Arikamedu on the Coromandel coast in 1945 by Mortimer Wheeler and his associates (see Wheeler *et al*. 1946: 17-124). The Arikamedu diggings yielded a variety of Mediterranean artefacts (terra sigillata pottery, amphorae, Roman glassware, lamps and beads). Wheeler drew from his experience of Arikamedu to author the first archaeological account of Indo-Roman trade in his book *Rome Beyond the Imperial Frontiers* (Wheeler 1954, also see Wheeler 1976). Subsequent to Wheeler, Arikamedu was excavated by the French archaeologist J-M. Casal (1949). The third and latest expedition to Arikamedu (1989-1993) comprised an Indian-American team led by Vimala Begley (see Begley *et al*. 1996). A good number of research papers, seminar proceedings and monographs on early Mediterranean maritime trade with India have been released since Wheeler's historic excavation at Arikamedu. We may mention here some of the important publications: *New Studies in Roman Commerce with the East* by M.G. Raschke (1978); *Roman Economic Policy in the Erythra Thalassa* by Steven Sidebotham (1986), the translation of the *Periplus* by Lionel Casson (1989); a collection of papers on the theme *Rome and India, The Ancient Sea Trade* edited by V. Begley and R.D. de Puma (1992), a source book on *Ancient Rome and India*, edited by R.M. Cimino (1994) and a recent collection of essays titled *Crossings, Early Mediterranean Contacts with India* edited by F. de Romanis and A. Tchernia (1997).

In recent times, there has been a perceptible shift from the 'Indo-Roman' to a broader 'Indian Ocean' canvas. In the last decade, three collection of writings on the archaeology and history of the early Indian Ocean world have been published. These are *Early Maritime Contacts in the Indian Ocean* edited by H.P. Ray and J-F. Salles (1996), *The Indian Ocean in Antiquity* edited by Julian Reade (1996) and *Indian Ocean in Antiquity* edited by S.Gupta (2002). A good quantum of archaeological data on the Indian Ocean world now exists. Transmissions of botanical and animal domesticates have been traced along the Indian Ocean rim; ancient harbours and trade routes identified on the ground; a range of exotic artefacts recorded, and diffusions of techno-cultural traditions (art, watercraft, metallurgy) observed in the material cultural record. Interestingly, articles on Roman sea trade with Indian Ocean lands are conspicuous in all the three compilations on the early Indian Ocean world. I suspect this is because new evidence of Roman long distance contact continues to emerge in all major littoral regions of the Indian Ocean.

The scope for opening an archaeological 'vista' of the trade is well articulated by Glover (1996: 131),

> 'Indo-Roman commercial undertakings seem to have been highly organised and are quite well documented in classical writing …I would also argue that virtually all new data on this trade are likely to come from archaeology, which has barely started to research the problem, rather than from literary and historical sources which seem to be finite and mostly known.'

Glover makes a clear distinction between the histories of Indo-Roman sea trade created from

textual sources and the largely untapped area of 'archaeology of trade' studies. Of course, the literary/archaeological dimensions have never been exclusive of each other. Warmington's (1928) classic work on the trade drew on the evidence of Roman coins that were being discovered in India since late 18th century. The most recent translation of the Periplus Maris Erythraei by Lionel Casson (1989) refers profusely to trade ceramics and field reports. I consider Steven Sidebotham's *Roman Economic Policy in the Erythra Thalassa* (1986) to be a seminal 'archaeo-historical' contribution to the study of Indo-Roman sea trade, following in the steps of Wheeler's *Rome Beyond the Imperial Frontiers*. Sidebotham brings together Greco-Roman texts, papyrus documents, ostraca and field data from the Egyptian coast to write a history of Rome's trade with Indian Ocean lands. However, much has happened since the publication of Sidebotham's book in 1986.

Most of the important port-sites listed in the Periplus and associated texts have been excavated in the nineties and later. Several preliminary reports have come out of Sidebotham's own excavation of the Roman harbour of Berenike on the Egyptian Red Sea coast (Sidebotham and Wendrich 1994 – 1999). The other major Roman Egyptian harbour, Myos Hormos, is being re-excavated by the University of Southampton following an earlier American excavation in the early eighties (Peacock *et al*. 2000-2002). Reports have been recently published of the Russian and French excavations of the 'Periplus' port of Qana in Yemen (Sedov 1996: 11-35; Salles and Sedov 2002) and the Italian excavations at the south Arabian harbour of Moscha (Avazini *et al.* 2002). As will be made clear in the pages ahead, intense field activities in the nineties on the Swahili coast, the Persian Gulf region, the Indian subcontinent and Southeast Asia have yielded prolific evidence of Roman and Indian long distance contacts. The growing archaeological database allows fresh perspectives in the history of Indo-Roman sea trade.

I believe that Roman contact studies come closest to the broader idea of the Indian Ocean interaction sphere. It should be recognized that the Roman initiative to open direct lines of commerce to India from the Egyptian Red Sea coast was a truly 'pan-oceanic' venture. There is reason to believe that the commencement of the trade drew into its ambit the major littoral regions of the Indian Ocean. This is indicated by the spread of the commodity base and the 'sudden' proliferation of Mediterranean and Indian trade artefacts across the Indian Ocean in the BC/AD transition (Fig. 2). These unprecedented developments were part of what Glover (1990: 10) describes as 'the first appearance of a world system' manifested in 'a vast network of trade stretching from the Mediterranean basin and the Red Sea to South China'. As the evidence suggests, the role of Indo-Roman sea trade in the rise of a complex and widespread trade system across the Indian Ocean was catalytic. The fallout of the trade went beyond the merely commercial. Indo-Roman trade influenced coastal urbanization patterns, political formations and techno-cultural traditions (from ceramics to art) along the Indian Ocean rim.

Therefore, in this study, the Indo-Roman connection is regarded more as a point of departure than an end in itself. Through this connection I seek to perceive the early Indian Ocean world - if not in completeness of the Childean criteria for 'civilisation' - then surely in terms of 'civilizational processes'; an intensifying exchange of goods, technologies and ideas which created a pan-oceanic interaction sphere over time. Colin Renfrew, in his introduction to *The Encyclopaedia of Ancient Civilizations* urges us to gain ' insight into the more general processes *which underlie* the formation of civilisation', saying further that 'while few definative conclusions can yet be claimed, there is near unanimity that the task is worthwhile and important …' (Renfrew 1980: 20; italics mine). The broadening of the discourse from Indo-Roman interchange to the notion of an Indian Ocean Interaction Sphere is to pursue the worthy theme of Trade and Civilization.

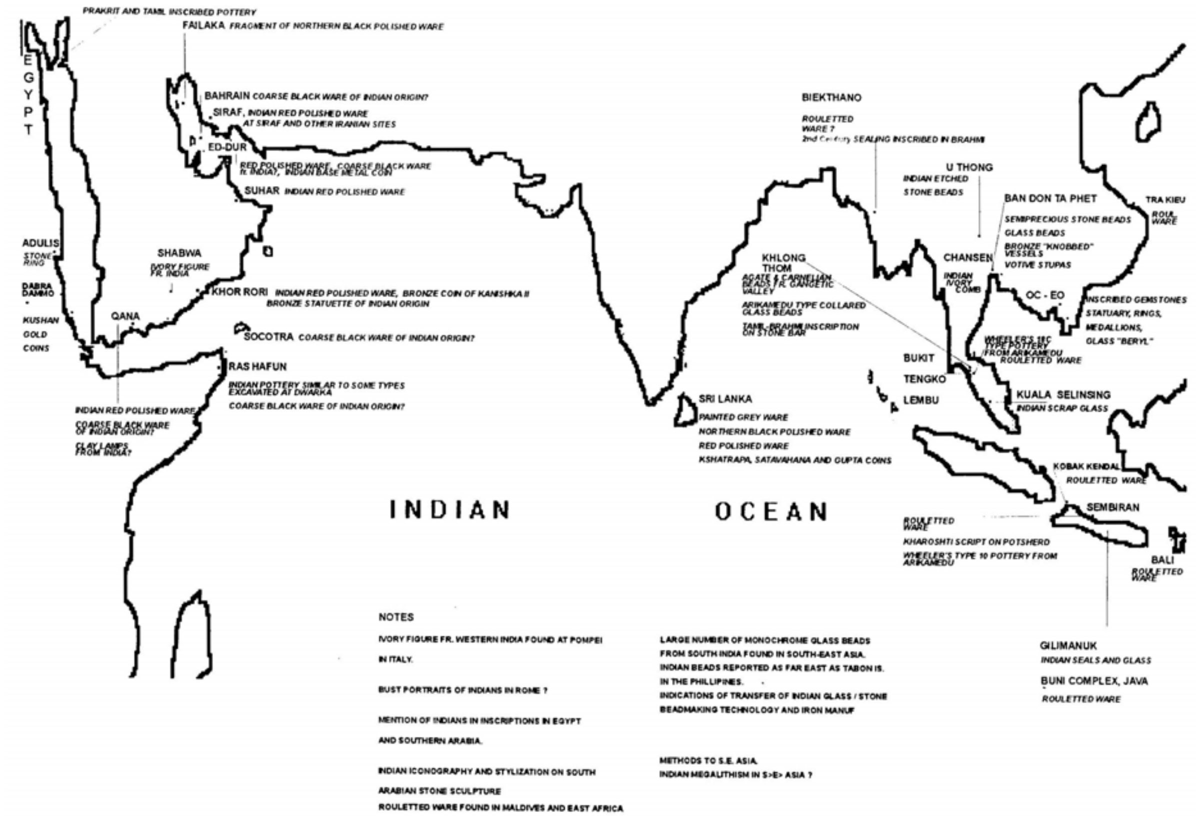


Fig. 2: Indian artefacts of early historic period found in the Red sea, Indian ocean region

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The Early Historic and Early Medieval Archaeology of Bogra District, Bangladesh

Sufi Mostafizur Rahman

This present study concentrates on the cultural history and settlement patterns of Bogra district during the Early Historic (*c*. 6th century BC to 6th century AD) and Early Medieval period (*c*. 8th century AD to 12th century AD) as revealed by archaeological data. Bogra district is situated between, 88° 58' to 89° 45' East, and 24° 32' to 25° 07' North in the Barind tract (fig 1).



Fig. 1: Map of study area in relation to landscape (modified *after* Salles 1998)

Objectives

No systematic archaeological investigation (except French-Bangladesh excavation since 1993) has been carried out so far in the study area. The present research (conducted during 1996-1999) has the following objectives:

1. Documentation of Early Historic and Early Medieval sites in relation to their ecological setting.
2. Reconstruction of cultural sequence.
3. An attempt at understanding the settlement patterns.

Methodology

In recent years, concepts like 'surface' and 'site' have undergone considerable modification. The focus of archaeological surveys has shifted from site to region and archaeological record is viewed as the distribution of activities and the resultant artifacts in the landscape rather than at a few points commonly referred to as 'sites'. New survey techniques and strategies have been devised to generate a more scientific and representative database for a meaningful interpretation of human behavioural patterns (Schiffer *et al.* 1978; Ammerman 1981; Foley 1981a, 1981b; Dunnel and Dancey 1983; Jochim 1990; Selvakumar, 1996). However, incorporation of such concepts in research projects, in a true sense, requires the employment of sampling and other intensive survey techniques, which was beyond the scope of the present researcher in terms of time and resources. Therefore, it was decided to survey the area by walking across the landscape and by adopting purposive techniques (Schiffer *et al.* 1978: 5) as each and every bit of land surface cannot be surveyed. Surface survey was undertaken for 1000 man-hours spanning 5 seasons, in the summer, winter and rainy seasons during 1996 to 1999. For locating ancient sites both summer and winter seasons are ideal. During the summer the land is bare, being free from standing crops and vegetation. Hence, one can see the distribution of artifacts in the agricultural fields as well as on the mounds, which are generally covered with grass and bushes in other seasons. In order to have a proper understanding of the environmental conditions, several surveys were made during monsoon, summer and winter seasons. Intensive walking at regular intervals and the village-to-village survey technique adopted were useful in locating the Early Historic and Early Medieval sites.

The topographic map (1 inch=1 mile, prepared by the Surveyor General of India during 1918 to 1934) of the study region was scanned and inquiries were made with the elderly and educated local inhabitants for locating the sites. Published works of Sen (1912, 1929), Bari (1979), Zakaria (1984), Ali and Bhattacharjee (1986) were also helpful in locating some sites. Besides surface survey, two trial trenches were excavated for identifying the temporal characteristics of the archaeological record. Available ethnographic data have been utilized as a complement to the archaeological evidence as also for reconstructing settlement pattern of the Early Historic and Early Medieval cultures.

The Early Historic and Early Medieval sites of the Bogra district are situated on the red bed Barind tracts that are slightly elevated terraces

on the alluvium. The area is higher in elevation in comparison to the surrounding plains and forms a distinct, relatively flood-free physiographic unit. The elevation of the district ranges from 15 m to 25 m above mean sea level. The plains are dissected by erosion and the ridge tops in between the depressions are almost level and the valley sides and floors have been terraced for cultivation. The ridge tops, which preserve evidence of human occupation in Early Historic and Early Medieval periods, have been considered as 'sites'. Human groups occupied most of the ridge tops during Early Historic and Early Medieval periods. Majority of the sites consist of a mound, which contains a burnt brick structure representing a *stupa*, temple, *vihara* or other structures. The term 'site' has been used in a broad sense including the mound(s) within it. Where different structures are present, separate approximate measurement of the mounds have been given to get an idea of the size of the structures. There are some isolated mounds also.

The ancient sites with a few exceptions are covered by modern settlements. The mounds or archaeological sites are locally called '*Dhap*', '*Dheep*' (corrupt form of Dhap), '*Bari*', '*Than*', '*Medh*' and '*Bhita*'. Most of the mounds and tanks have local names. Some of them are also associated with legends.

Some sites are very closely spaced, making it difficult to separate one site from the other. In such cases 'site' has been defined on the basis of spatial discontinuity, i.e. mounds representing an ancient settlement, whether large or small in size, have been considered a single site. On the other hand, when one mound is not spatially connected with another nearby mound, the two have been considered as separate sites.

In the site description, some Bengali terms like *Khal*, *Nala*, *Bil*, *Pukur* and *Para* have been used. *Khal* and *Nala* mean a canal and *bil* denotes a large swampy tract. A *bil* more or less corresponds to a small lake and ranges in size from a quarter of sq km to 2 sq km. It contains water all the year round but the volume increases in the monsoon and declines in the dry season. *Pukur* denotes a tank. The average size of a *Pukur* is 100 x 100 sq m. However, there are some large tanks, measuring up to 800 x 300 sq. m. The term *Para* more or less corresponds to a hamlet. A village consists of more than one *Para*.

The size of the sites has been calculated on the basis of the area over which artifacts are distributed. Most of the sites are covered by modern occupation, the distribution area of artifacts and therefore the size of sites could not be measured precisely.

It is disappointing to note that in Bangladesh there is no diagnostic type of pottery. Therefore, on the basis of surface finds it is not possible to classify ceramics as Early Historic and Early Medieval. In such cases, pottery found on the sites has been designated 'ancient ceramics.' Hence, it was not possible to fix a tentative chronology of the sites as Makkhan Lal (1984) could do in the case of Kanpur district in the Ganga-Yamuna doab in India on the basis of pottery. However, periodisation of a few sites has been attempted on the basis of Northern Black Polished Ware (NBPW), Rouletted Ware and Black Slipped Ware (BSW).

For building a chronology of the sites the size of burnt-bricks has been used as a criterion (Rahman 1999: 321-326). Unfortunately, complete bricks were not available in adequate numbers at most of the sites because the earth of the mounds is compact and hard and it is not easy to extract bricks without damaging them. Also, local people remove all complete bricks from an exposed section. Thus, brick measurement was restricted only to a few specimens, sometimes a single one. However, it is worthwhile to mention that the measured size may not be the only brick type(s) preserved at the site. There might be bricks of other sizes as well, which were not available for measurement. It is also difficult to determine whether a site was temporarily or permanently occupied. The thickness of the deposit is not a very reliable indicator of the duration of a site. As Chang (1972:10) says, 'a pile of industrial waste accumulated by ten flint Knappers in one day or a pile accumulated by one flint Knapper in ten days would be difficult, if not impossible, to determine.' In this context there is a serious problem in the study area. Exposures caused by artificial cutting or natural erosion are not

available at each and every site to determine the thickness of the habitation deposit. Yet, another limitation was that artifacts of the older periods like NBPW come from lower levels of a site; but exposed sections extending to the base of the habitation deposits are scarce.

During explorations 135 sites were located in an area of 2920 sq km in the Bogra district (Appendix 1). This figure also includes 79 sites reported earlier even though these were not always explored in a professional manner.

To understand the Early Historic and Early Medieval settlements of Mahasthan region in Bogra district in a proper perspective it is necessary to know its present-day ecological setting: physiography, geology, drainage systems, soils, climate, flora and fauna, raw materials for making tools, weapons and other objects and the resources for the subsistence. These are summarized below.

Geology and Landforms

The Karatoya river traverses the district from north to south and divides it into two unequal portions with distinct characteristics. Broadly speaking the eastern part of the Karatoya plain consists of recent, sub-recent and older floodplain sediments dominated by silt and clay-sized particles, and the western part is occupied by older, somewhat compact, alluvium termed 'the Madhupur clay' which is known as 'Barind tract' (fig. 2).

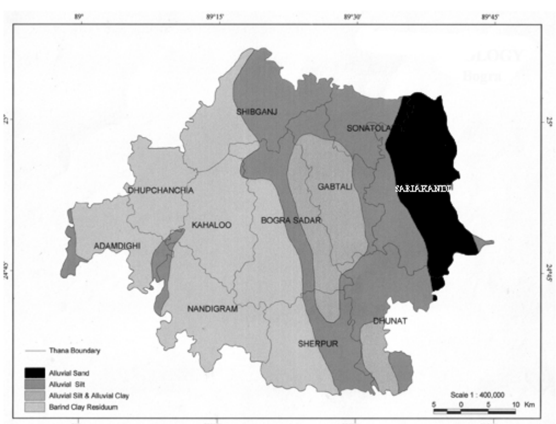


Fig. 2: Geological map of the Bogra district (*courtesy* EGIS)

Most of the floodplain has a gently undulating topography. Major part of the Barind tract is nearly level. Small areas both in the floodplain and the Barind tract have relatively higher ridges. Differences in elevation between ridges and adjoining basins are slight. Elevations on the floodplain above mean sea-level range from a maximum of 17 m in the north-east to a minimum of less than 10 m in the south-east.

Parts of the high terraces of the Barind tract situated along the western side of the Karatoya are much dissected and the remaining part is almost level. Elevations above mean sea level range from a maximum of 29 m in the north-west to a minimum of 11 m in the south-west.

There are five major physiographic units in Bogra district (fig. 3). These units are described below:

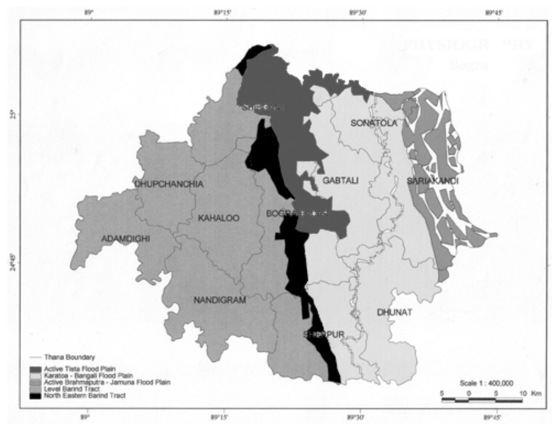


Fig. 3: Physiographic map of Bogra district (*courtesy* EGIS)

(I) Active Brahmaputra-Jamuna Flood Plain.

This floodplain comprises numerous *chars* (temporary islands) and unfilled channels in the braided channel of the Jamuna (young Brahmaputra) river together with young alluvial land adjoining it. *Chars* and areas adjoining active river channels are subjected to drastic change in every flood season by river erosion or new alluvial deposition. The deposits are stratified sand and silts and the relief is irregular with relatively high ridges separated by depressions. Adjoining young floodplain is less liable to change by river erosion and receives new alluvium deposits only erratically.

(II) Karatoya-Bangali Flood Plain.

This unit is a complex landscape containing sediments of diverse ages and origins. In the west, the sediments apparently come from an older course of the Karatoya. In the north-centre, in a depressed area between the main Karatoya and Bangali levees, sediments from rivers appear to have partially buried an older landscape, an extension of the lower Tista floodplain. The greater

part of this floodplain comprises broad ridges and basins. Silts predominate on the ridges and clays in the basins. Sandy soils occur only patchily on ridges and along river channels.

(III) Active Tista Flood Plain.
This unit occupying northern part of Bogra district along the Karatoya river has possibly been slightly uplifted. The topography comprises mainly low ridges and almost-level depressions with numerous abandoned channels. There are numerous man-made cultivation platforms in the strip adjoining the eastern edge of the Barind tract. The surface deposits are mainly silt and sandy materials and usually occur below 0.91-1.22 m.

(IV) Level Barind Tract
This unit occupies the western part of the district and comprises a low nearly level, uplifted terrace. The edges of the outcrop are marked by fault scraps. The Karatoya and Little Jamuna channels run at the foot of these scraps. The level Barind tract includes grey, variably mottled, slowly permeable soils overlying little weathered Madhupur clay at a shallow depth.

(V) North Eastern/ Broadly Dissected Barind Tract
This unit is relatively higher than the remainder of the tract and occurs mostly in the eastern margin and north-eastern part of the Barind tract. This area has been uplifted, tilted and broadly dissected by valleys, most of which are streamlines, and has relatively deeply weathered, well to moderately well drained red or brown soils. According to the Geological map of Bogra district (fig. 1), these sediments are contemporary with the Dupitila formation (possibly of late-Miocene age), but uplift of the deposits may have occurred much later'

Drainage

a. Rivers

There are small and big rivers in Bogra district (fig. 4). Taking the Karatoya as the central dividing water-channel of the district, the other rivers may be classified into the eastern and the western systems. The eastern rivers are the Jamuna, the Manash, the Bangali and the Charkadaha besides a few smaller ones. Through the *Khiar* tracts in the western parts of the district flow the Nagar, the Tulshiganga, the Bhadai, and other minor streams.

Evidences show that the Karatoya and Nagar have changed their courses in the past, while the Jamuna, lying on the eastern boundary of the district, is in fact a new channel of the Brahmaputra. By the early 1770's the major diversion of the Brahmaputra into its present channel, west of the Madhupur jungle, had occurred (Bari 1979).

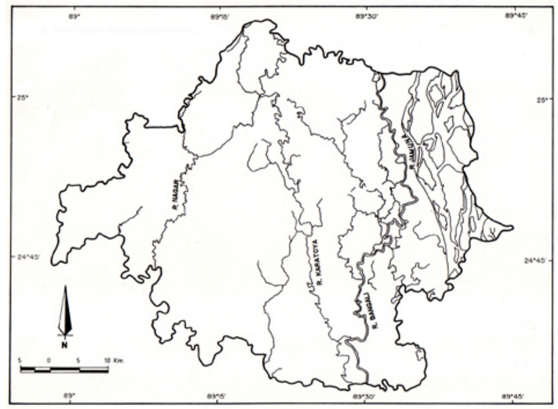


Fig. 4: River network in Bogra district (*courtesy* EGIS)

The Karatoya might have played a major role in shaping the early settlements in the region. It is a meandering river. It was formerly the main channel of the Tista, and possibly also a distributary of the Brahmaputra (Rashid 1977). In the Seir-ul-Mutakhrin (cited in Rashid, 1977: 59) it is recorded that this river was three times the size of the Ganga when Bakhtiar Khilji invaded the Northern Region (*c*. 1204 AD). Van den Broucke, a Dutch Governor, showed the Karatoya as a great river in his 1660 map and as connected to the Brahmaputra. The Karatoya is also shown as a very large river in Major Rennell's map prepared in 1789. Buchanan Hamilton in his accounts of Dinajpur and Rangpur, compiled about the year 1810, speaks of it as "a very considerable river of the greatest celebrity in Hindu fable".

Due to tectonic disturbances and floods the river is now broken up into four distinct parts. Different parts of the river are dry the winter.

b. *Bils* and Tanks

In the district of Bogra there are numerous marshes and *bils*. Besides, there are numerous small marshes, especially in the eastern part of the district, which dries up from the end of January till the rains. The overflow of the floodwater from the Jamuna (Brahmaputra-Jamuna) and the Bangali submerges the greater portion of this part of the country and gives it the appearance of an extensive lake.

The number of tanks in the district is considerable; especially in the broadly dissected Barind tract area where tanks are fairly numerous. Villagers of Goqul, Palashbari, Mathura, Bamanpara, Saralpur, Hukmapur, Tengra, Arola and Baghohalli believe that there are 365 tanks in each of their villages. However, there are not exactly 365 tanks in each of the villages but the number is very close to it. The average size of the tanks is 100 x 100 sq m some are large tanks, measuring up to 800 x 300 sq m. These tanks provide water for bathing, pisciculture and also for irrigation. Water of some tanks may be used for drinking, but it is likely, with the installation of numerous tube-wells, that the water of tanks has ceased to be a major source of drinking water. Most of the tanks are very old and with the lapse of time a large part has silted up. Local cultivators are also bringing the silted up portions under cultivation.

Soils

The soils of Bogra district are developed either in the semi-consolidated older Madhupur clay (Barind tract) or in unconsolidated, relatively, young alluvium sediments (floodplains). On the Barind tract, the soils are developed on older alluvium, known as the Madhupur clay. Floodplain soils are developed in predominantly silty, unconsolidated, younger alluvium sediments. A survey (The Soil Resources Development Institute 1973) classified the soils under three broad physiographic units (fig. 5).

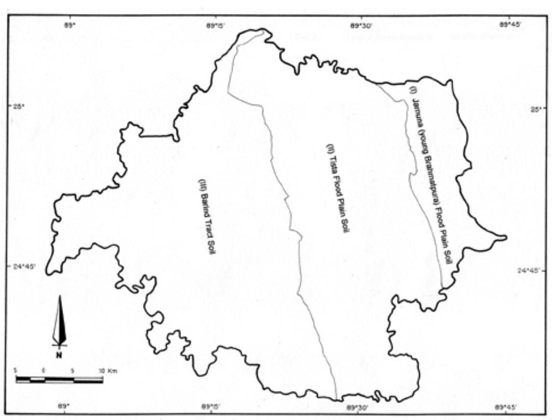


Fig. 5: Soil map of Bogra district (modifid *after* Brammer 1972)

(I) Jamuna (young Brahmaputra) Flood Plain Soil.
This area occupies the extreme eastern part of the district along the west bank of the Jamuna river. The deposits of the area are raw, stratified olive to olive-grey sands or silts. They occupy a rather irregular somewhat undulating seasonally flooded landscape subject to frequent on-rush of floodwater and severe erosion.

(II) Tista Flood Plain Soil
In a broader sense, Tista flood plain soil includes two physiographic units: Karatoya-Bangali flood plain and active Tista flood plain. The Tista flood plain comprises an area of complex landscape containing sediments of diverse ages and origins. The greater part of this unit includes broad ridges and basins and the remainder is occupied by human-made platforms. The ridge soils are intermittently to shallow flooded, imperfectly to poorly drained and have olive to olive-grey or dark grayish brown silt loam to silty clay loam subsoil. The basin soils are predominantly clayey and grey to dark grayish brown in colour. Sandy soils occur along river channels and on patchy ridges.

(III) Barind Tract Soil
The Barind tract comprises almost flat terrace areas and nearly level to very gently undulating relatively higher ridges with narrow valleys. Two broad groups of soil occur in this tract: brown and reddish soils on the ridges, and grey and yellowish brown soils on the lower parts. The major ridge soils are brown or reddish, friable clay loams over mottled clay. The soils on the summits of high ridges are well to moderately well drained and the soils of sloping parts are imperfectly to poorly drained, because of temporary water logging during periods of heavy rainfall.

Extensive areas of nearly level low terrace are poorly drained and have grey, variably mottled, silty to clayey soils over partly weathered or unweathered clay substratum. Valleys have grey or dark grey, friable, porous loamy soils or grey to dark grey, prominently mottled, clayey soils.

Climate

Bangladesh has a tropical monsoon climate. High temperatures, heavy rainfall, often-excessive humidity and fairly marked seasonal variations characterize the climate. There are significant differences in rainfall, temperature and exposure to climatic hazards within the country, but the overall climatic pattern is similar. Four main seasons are recognized by Hugh Brammer (1996: 15-16).

i. The pre-monsoon season, March-May, has the highest temperatures and evapotranspiration rates. Occasional line-squalls (heavy thunderstorms with strong winds) occur.

ii. The monsoon season, June-September, is the period of highest rainfall, humidity and cloudiness. More than 80 percent of the annual rainfall normally occurs during this period.
iii. The post-monsoon season, October-November, is hot and humid, but sunny, with heavy dew at night. There are occasional thunderstorms.
iv. The dry season, December-February, is relatively cool, dry and sunny. There usually are a few winter rains, but their occurrence is uncertain (though beneficial for agriculture when they occur).

The seasons are broadly representative for the whole country including Bogra district. The main differences within the country are in the lengths of the rainy season and of the cool winter period: in the extreme west, four months have mean rainfall in excess of mean evapotranspiration whereas in the extreme north-west there are seven months with excess rainfall; and the mean length of the cool winter period increases from less than two months near the coast to over three months in the extreme north. An important characteristic of the climate is the year-to-year variability in the dates of onset and end of the individual seasons and in weather events within them.

Considering the variations in temperature, pressure and precipitation- the study area can be included within the following climatic sub zone Bogra district: Hot summer, moderate rainfall.

Temperature

The maximum temperature ranges from 37°C to 39°C whereas the minimum temperature varies from 7°C to 10°C

Rainfall

The annual precipitation decreases from east to west. Mean annual rainfall is 1763 mm. Maximum annual rainfall is 2547 mm and minimum annual rainfall is 1133 mm. Rashid (1977: 103) writes, 'The West Barind, and probably the East Barind too, can have very variable rainfall in certain years. In 1873 the west Barind recorded a mere 692.30 mm; probably the lowest ever recorded anywhere in Bangladesh.' The District Gazetteer (Bari 1979: 22-23) has recorded famine during 1866, 1895-96 and 1896-97 AD in Bogra district which was caused due to insufficient rainfall in the region.

Flood

Destructive floods are one of the most serious handicaps in Bogra district. Flooding in Bogra district unlike more or less other parts of Bangladesh is mainly due to the accumulation of rainwater except over small areas along Jamuna (Brahmaputra-Jamuna) and Bangali rivers, which are affected by over flow from these rivers. Rainfall directly affects the ground water table, which often rises above ground level during the period of heavy rainfall in the monsoon. In the vicinity of the rivers, it appears that the floodwater is unable to drain away because of the high river levels during the rainy season. It is worthwhile to mention that the heavy rains need not always be in Bangladesh. If it rains heavily anywhere in the large basins of the several river systems, its effects will sooner or later be felt in Bangladesh.

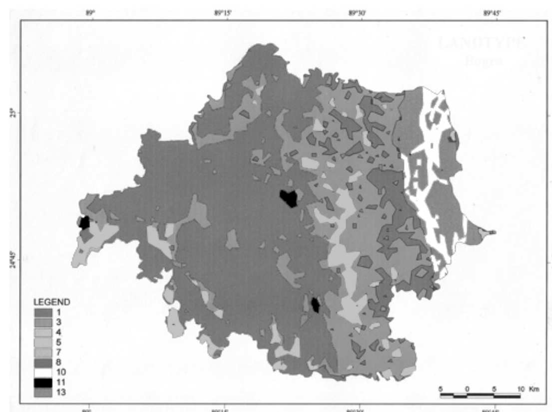


Fig. 6: Inundation land type of Bogra district (*courtesy* EGIS)

A survey (The Soil Resources Development Institute 1972) says that over 80% of the Bogra district is flooded to varying depths for 3 to 7 months during monsoon (fig. 6). This comprises nearly level ridges of Barind tract and lower part of the floodplain ridges and basins. Depth of flooding depends mainly on the topographical position. It is highest in the basins and lowest on the ridges. Man-made lands, mainly in Shibganj thana, high ridges of floodplain as well as Barind tract and homesteads are above normal flood level and this comprises about 20% percent of the whole area. The level terrace of Barind tract (about 45%) is flooded to a depth of 0.15 m to 0.60 m for 2 to 3 months. About 25% accounts for lower floodplain ridges, which is flooded to a depth of 0.60 to 0.91 m for 3 to 4 months. About 10% is flooded up to 0.91 to 1.83 m for a considerable period during monsoon. These basins remain wet in the early part of dry season; these include almost all the

floodplain basins and depressions to the north-east and south-east of Bogra and some valleys in the Barind tract. In the extreme eastern part of the Bogra district about 4% of the total area suffers from sudden on-rushes of floodwater from the overflowing the banks of the Jamuna river.

In the District Gazetteer (Bari 1979) several severe floods during 1864, 1886, 1918, 1922, 1954, 1955 and 1970 have been recorded in the Bogra district, which caused great havoc. During 1988 and 1998 the district experienced great floods along with major parts of Bangladesh. Two thirds of the country was submerged during the 1998 flood.

Drought

Although generally the district of Bogra experiences sufficient rainfall during the monsoon, sometimes in the past it experienced less rainfall, which caused failures of the harvest. The western part of the Karatoya, mainly the Barind tract is generally above flood level and depends on rain for its moisture. For these reason the rice crops of this region are liable to suffer from drought. The paucity of data hardly allows any detailed study of drought. However, the District Gazetteer of Bogra (Bari 1979) has recorded two seasons of crops failure each during 1866, 1895-96 and 1896-97 due to deficient of rainfall.

Flora and Fauna

The Bogra district has a wide variety of flora and fauna (Bari 1979: 10-16).

Size and Distribution of Sites

The region was occupied by a number of settlements of varying sizes at different periods (Figs. 7 & 8). Here an attempt has been made to understand their distribution pattern at various micro locations with respect to their sizes. The role of local ecology and the other factors have been considered to understand their tentative functions in a broad sense.

The earliest culture so far identified in the area is NBPW. So far nine sites with NBP ceramics have been located. Of the Early Historic period there are five sites (excluding NBPW), Early Medieval 90 and remaining 31 are unidentified. It has been observed that some of the NBPW and Early Historic sites continued to be occupied till the Early Medieval period.

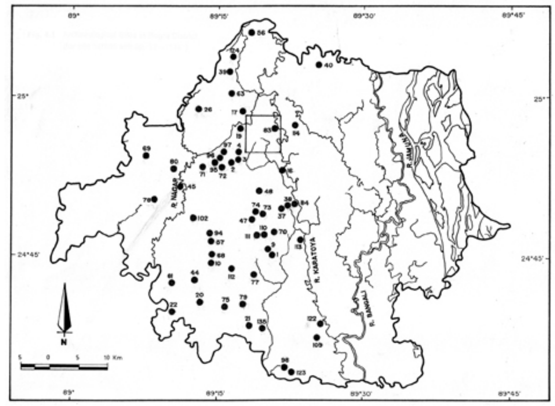


Fig. 7: Archaeological sites in Bogra district

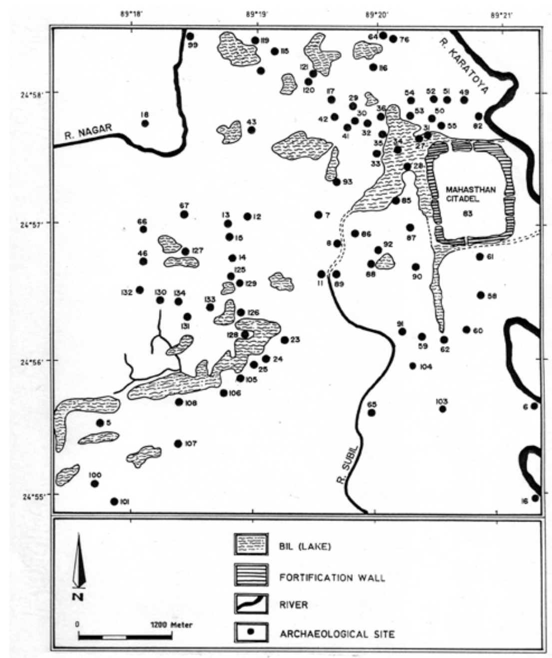


Fig. 8: Box enlarged as figure 7

Following are the number of sites, which are categorized in respect of their size hierarchy.

Size of Sites	Number of sites
Below one ha.	53
1 - 1.99 ha	9
2 - 2.99 ha	4
3 - 3.99 ha	11
4 - 4.99 ha	8
5 - 5.99 ha	10
6 - 6.99 ha	8
7 - 7.99 ha	11
9 - 9.99 ha	2
10 –10.99 ha	5
12 - 12.99 ha	3

Besides the above there are also a number of individual sites, which exceed 13, hectares. The

sites of these categories measure 14 ha., 15 ha., 16.25 ha., 20 ha., 30 ha., 31 ha., 33 ha., 40 ha., 60 ha. 63 ha. and 208 ha.

Following patterns are observed in the nature of the site distribution.

The total number of sites located on the riverbanks is 14. Of these nine are located on the right bank of the Karatoya, two on the right bank and one of the left of the Nagar and two on the right bank of Kokai Ganga. There are 30 sites located not far away from the riverbanks. Among these 16 are situated within a radius of 0.5 and 1.25 km from the Karatoya. The same distance is also noticed for the sites located on the banks of other rivers.

Thirty-two sites are situated on *bil* banks and the other 59 sites are associated with tanks.

From the above analysis it is observed that 44 settlements depended on river sources, 32 were *bil* based and 59 were attached to tanks.

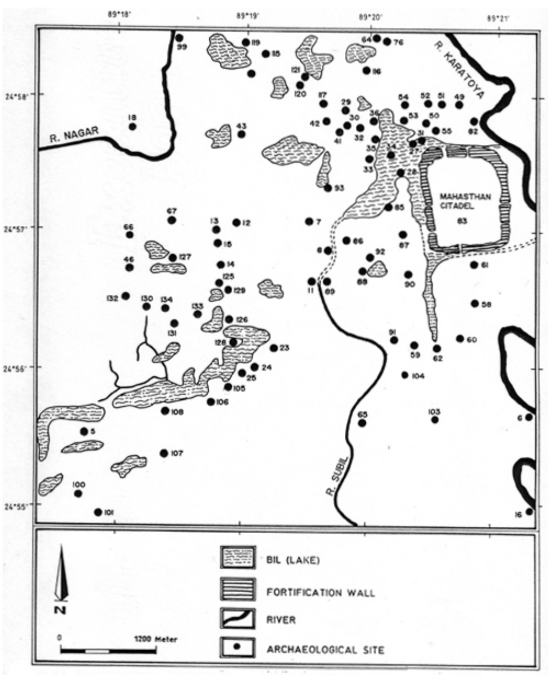


Fig. 9: Nucleated pattern settlement in Bogra district

Sites of the region are patterned in diverse ways. The first category of sites, numbering 76 is distributed in nucleated fashion with Mahasthan citadel as the central place (fig. 9). Similar pattern is also noticed at Bangarh in West Bengal (Goswami 1948), Sisupalgarh in Orissa (Lal 1949), Kausambi in the Gangetic Plain (Sharma 1960), where around the citadel a number of other sites are clustered. In the context of Bengal, B. D. Chattopadhyaya (1993-94) refers to the sites as 'complex of sites'. P. C. Chakravarti (1943: 643) writes that early rural Bengal settlements were nucleated. He argues that such type of settlements were best adapted for the agrarian system. Analyzing Mahasthan, Bangarh, Gaur, and Pandua, B. M. Morrison (1977) concludes that the sites were made of two parts, a large composite site surrounded by a brick wall and a dispersed array of smaller structurally simple sites.

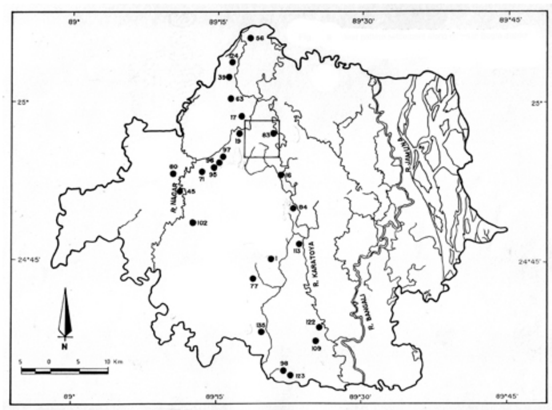


Fig. 10: Linear pattern settlement along rivers in Bogra district

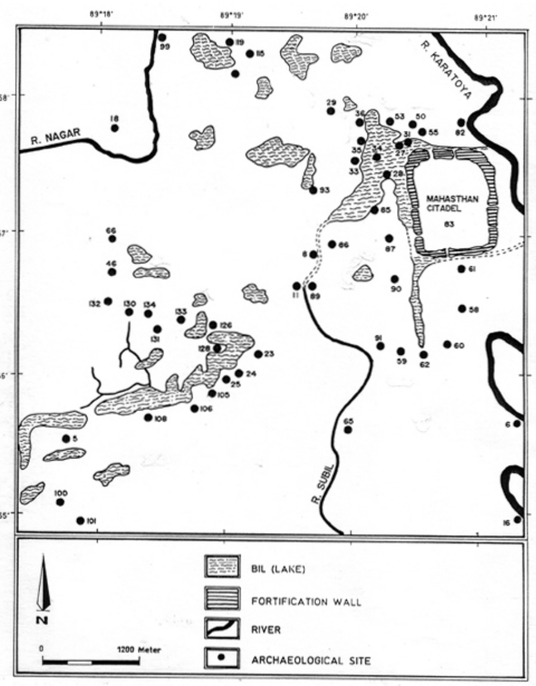


Fig. 11: Linear pattern settlements lakes (*bills*) and rivers in Bogra district

The second category of sites numbering 72 are linear settlements located along the right bank of

river Karatoya and both banks of Samrai *bil* (figs. 10, 11).

The third category of sites numbering 36 are dispersed settlements situated away from the citadel (fig. 12). Almost similar settlement patterns have been observed in the Ajay river valley in West Bengal by Chowdhury (2002).

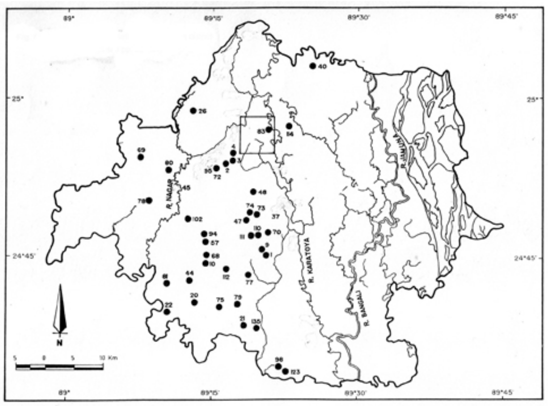


Fig. 12: Dispersed pattern settlement in Bogra district

During the explorations at Bogra district, it was found that settlements were traced on most of the tank embankments especially in the nucleated area. In some cases the occupation on the embankments started in the NBPW period itself. The other features noticed are the clear-cut distinction between the secular and religious settlements. In some cases the secular and religious sites exist side by side while in other cases the sacred centres are oriented a little away from the habitation. Religious structures are abundant in burnt bricks whereas in the secular settlements the brick concentration is poor. It appears that dwelling houses were built of different perishable materials such as mud-wall, and thatch-roof.

Factors Affect Settlement Pattern

Why was a particular settlement located where it was? Why did the settlement pattern change through time within a given area? What were the ecological conditions, which restricted the growth of settlements in one area and stimulated it in another area? These are some of the general queries posed by a number of archaeologists (Bylund 1975; Clarke 1976; Doxiadis 1968; 1969; Hudson 1969; Smith 1972; Trigger 1968). All the scholars emphasize that the strategy of site location relates to a number of ecological factors like terrain, water source, availability of arable land, pasture land, building material and raw material. Besides, there are cultural factors such as trade, political organization, warfare and religion, which also affect selection of settlements.

The Early Historic and Early Medieval people of Bogra district had selected their settlements in the flood free ecological niches. It has been observed that over 80% of the Bogra district is flooded to varying depths for 3 to 7 months during monsoon.

Thus to prevent the settlements from flooding the Barind tract was extensively used. In this tract 133 out of 135 sites are located. Within the Barind tract the settlements including the Mahasthan citadel are mostly concentrated on the eastern part of the broadly dissected zone, which is less affected by flood. Although seasonal floods affect the tract, they do not reach the ridges where the settlements are located. The floods are confined to the valleys in the broadly dissected and low plain land in the level Barind tract. However, the valleys and plain low lands are inundated by flood, which provides fresh alluvial deposit suitable for cultivation. Makkhan Lal (1984) also observes that settlements in the Ganga-Jamuna doab in U.P., India are located also on high terraces in the area of inundation overlooking the river and vast flood plains.

Two sites, which are located on the eastern part of the Karatoya i.e. in the flood plain area. Here the settlers might have chosen the area on an experimental basis and they probably abandoned the places after experiencing the inconvenience caused by flood.

The sites located on the laterite formation appear to be the remains of dominant agricultural centres. This is testified by the presence of thick layers of fluvial deposit over the laterite horizon from the Pleistocene period. This alluvial deposit is excellent for agriculture (Salles 1998: 191-192). The ethnographic evidence supports the large-scale practice of rice cultivation and mixed farming over the laterite deposit.

As the locations of those sites are close to the alluvium, it is quite plausible that the early inhabitants exploited the area for agriculture.

The archaeological evidence, the Mahasthan inscription and ethnographic data support large-scale agricultural production in the area. It has to be borne in mind that the region is devoid of

resources like, stone, semi-precious stone, iron, and copper. But the remains of exotic objects like glass beads, semi-precious stone beads, copper antimony rods and a large number of stone sculptures indicate that they were obtained from far-off regions through trade of agricultural surplus. In this context the discovery of cowries is significant. Because, it shows the surplus of rice in the archaeological context as referred in historical account of Ibn-Batuta. In Bengal rice was exchanged for cowries from the Islands of Maldives in the Indian Ocean during 14th century (Sastri 1939: 252-253).

The large number of burnt brick structures also indicates the affluent condition of the settlers of the region.

Besides, providing water for irrigation and domestic needs the rivers might have played a crucial role in shaping trade and commerce in the area. The gold-foil glass beads of Alexandria origin, Sandwiched glass beads of Middle East origin, Indo-Pacific glass beads of Arikamedu or Mantai (Sri Lanka) origin, different types of semi-precious stone beads may have reached from different industrial centres of the Subcontinent Rahman 1998, 1999). Further the Glazed Ware of Roman (?) or Persian Gulf origin might have reached here through river Karatoya which was a large river in the area during early times (Rahman 1999: 172-175). The discovery of classic NBPW and Rouletted Ware also indicates Mahastahan's direct or indirect contacts with Ganga Valley and Mediterranean region (?) (Rahman 1998, n.d.)

A local legend also speaks of Pundranagara's connection with other regions. The legend narrates that Lakshmindar the son of a merchant, named Chandsaudagar of Pundravardhana got married to Behula, the princess of Ujjaini. The legend recalls the association of Pundravardhana with Ujjaini, an Early Historic urban centre located in Madya Pradesh, India. Ancient Ujjaini was a famous trade and semiprecious stone bead-making centre (Chakrabarti 1997: 223-225).

The reference to Pundravardhana also occurs in inscriptions found outside the region. Two votive inscriptions at Sanchi record the gifts of two inhabitants of *Punavabhana*, which is another name of Pundravardhana (Bagchi 1943: 412).

Thus it can be said that both agriculture and trade-and-commerce played important roles in shaping the economy of the region.

Besides, water bodies like rivers, *bils* and numerous tanks might have been important source of food. The recovery of a number of terracotta net sinkers from the sites leads us to infer that nets were used for catching fish. Ethnographic evidence shows the existence of traditional fishing in the area. Although the paucity of data does not allow us to provide any definite conclusion regarding the animal resources exploited in the area, the sedentary life, agrarian land and existence of jungles suggest the exploitation of domestic and wild animals by early settlers. The diverse animal list recorded in the District Gazetteer (Bari: 1979) supports the above assumption

In the absence of evidence of early irrigation technology, it can be inferred that the existing rivers, *bils* and tanks were the main source of irrigation in the region. Ethnographic evidences show the practice of traditional lift irrigation in the area

Carole Breckenridge (1985) observes that the co-existence of temples and irrigation tanks during the Vijayanagara era (1350-1750 AD) was neither accidental nor random. Suchi Dayal (1997) speaks in a similar way while describing the pre-medieval Shorapur settlements and tanks. She mentions that tank water was used for ritual and domestic purposes as well as for irrigation. A large number of tanks are found in the Barind tract.

The annual mean rainfall of the district is 1763 mm. and the rain water in the tanks remains all the year round. The ground water table in the study area is lower than in other parts of the country. Thus, a large number of tanks could have been used for domestic purposes such as drinking, bathing and washing, and also for irrigation especially, in times of droughts and famines.

The lateritic clay which is a useful resource for construction of dwelling houses is likely to have been exploited by the earlier settlers in the area as is the practice today. Ethnographic observation in the region has revealed that about 90% walls of dwelling houses are made of lateritic clay. This 50 to 60 cm wide mud wall saves her dweller from excessive heat during the summer and from cold during the winter. This available raw material for

building houses was a great advantage for the ancient settlers in the region.

Besides, the above ecological factors cultural factors like, political organization, trade and religion had played important role in growing the settlement in the district. Pundranagara was an administrative centre during Maurayan, Gupta, Pala and Sena periods. Under the royal patronage the city and the surrounding settlements flourished. The settlements were richly networked through the prominent river and land routes. As the archaeological evidences show they acted as interdependent units to procure resources and finished products. It was the internal dynamic of the village settlements which stimulated the growth of urbanization and far-reaching trade networks. It is quite possible that a political system like a civic body existed for controlling and managing the settlement system.

The region was a seat of Buddhism and Hinduism. Several Buddhist *viharas* and Brahmanic temples flourished in the region under benign royal patronage (Chakrabarti 1995). Along with Bhasu *vihara* and Totaram Panditer Bari *vihara* so far identified in the study area, the Somapura Buddhist *maha vihara* and Jagadal *vihara* located 30 km and 20 km respectively away from the Mahasthan citadel are worth mentioning. Such religious institutions facilitated intricate blending between the human settlements and sacred complexes.

The above mentioned first category of settlements are located in linear fashion along the river and *bil* due to availability of water for domestic, ritual and irrigation needs. The arable land and aquatic resources also helped in sustaining the sites.

The second category, the nucleated sites, is located in the broadly dissected Barind tract because of a higher occurrence of floodfree ridges in the area. The other important aspect was close existence of the citadel with which the nucleated settlers were interacting. In the nucleated area settlements were functionally diversified. It may be suggested that they were less agriculturalists by profession and occupied more as royal employees, soldiers, artisans, traders and manufacturers. The above interpretation is based on the high density of sites in a comparatively small area, where the amount of agricultural land is less in ratio with the settlements.

The third type is dispersed settlements which are located in the level Barind tract. In this area there are less ridges and more plain lands. We have mentioned earlier that plain lands are more affected by seasonal floods. This could be the reason for the inhabitants to settle in dispersed fashion on ridges. Further, the settlers might have also accessed in more arable land for cultivation.

Conclusions

We can now briefly summarize the main results of the investigations and analyses and make some suggestions for future study:

1. Although the British scholars started archaeological study in the region during the nineteenth century and subsequently some private initiatives, Archaeological Survey of India and Directorates of Archaeology of Pakistan and Bangladesh carried out sporadic investigation, most archaeological studies in Bangladesh are still in an antiquarian stage.
2. Out of 135 explored archaeological sites (79 previously reported and 56 discovered by the author) nine belong to NBPW period, five to Early Historic period and 80 to Early Medieval period. The chronology of 31 sites cannot be ascertained due to paucity of data. However, without accepting or rejecting my discovery and chronology of sites, Smith (2002) places only the fortified site of Mahasthangarh in the early Historic period and Bhasu Bihar and Bihar in Gupta period. Her division of Early History starts from 3rd century BC and ends at 2nd century AD, and the Gupta period starts at 3rd and ends at 6th century AD. Before placing the Bhasu Vihara in Gupta period we have to keep in mind that archaeologically it has not yet been proved so (Rashid 1979).
3. Functionally, the sites can be divided into habitation, religious, citadel, bead manufacturing centres and pottery production centres. In most of the cases habitation and religious sites exist side by side while in some cases religious centres are located a little away from the habitation.
4. The earliest culture so far traced in the area belongs to the NBPW period, although Chakrabarti (1992) predicts Black-&-Red culture in the region as an antecedent of the NBPW. The discovery of a sherd of Black-and-Red ware (Chakrabarti 1992) from Bangarh makes the above hypothesis plausible. But Salles (1998), Salles *et al* (2002)

on the basis of environmental grounds and artifacts tries to argue that Mahasthan cannot have existed before the Mauryan period. His argument does not sound healthy; on the other hand Chakrabarti's hypothesis seems feasible (2001). In addition, a small scale excavation at Wari-Bateshwar which is close to Mahasthangarh during 2000 has placed the site to 5th century BC (C-14 dates). The recent excavation during 2005 at Wari-Bateshwar has revealed pit dwelling and Black-&-Red ware which indicate the existence of human settlement at Wari-Bateshwar during Chalcolithic period (?). (We are doing C-14 dates and other analyses for confirmation). If Chalcolithic culture at Wari-Bateshwar is established then Salles's hypothesis regarding the non existence of pre-Mauryan phase in the region will be faded away.

5. The exploration revealed six more NBPW sites. Considering the size of Mahasthan citadel (208 ha.) and cultural deposit. We expect some more NBPW sites in the region. In the light of the number of sherds, colour, gloss and fabric of NBPW and its association with Rouletted Ware, the NBPW phase at Mahasthangar region has been tentatively placed within a time bracket of *c.* 400 to 250 BC. It might have continued up to 1st century BC. However, recent excavation by France-Bangladesh has placed Mahasthangarh to late 4th or beginning 3rd century BC (level 1). The C-14 date from the level 5 is 366-162 BC. The excavation reveals that human occupation continued at the site till 18th century AD (Bernard *et al.* 2002).
6. The selection of sites for settlements was made over the flood free physiographic patches of the Barind tract overlooking the rivers and on vast alluvial lands to the eastern part of the Karatoya and other flood plains.
7. Although settlements are located in the flood free zone they are close to the rivers, *bils* and tanks. These water sources would have provided the settlers water for every day domestic and livestock needs and probably for irrigation also. The settlers are likely to have exploited the aquatic resources for food.
8. The sites located on Pleistocene laterite formation appear to be the remains of dominant agricultural centres. This is testified by the presence of a thick layer of fluvial deposit over the laterite horizon of the Pleistocene period. This deposit is very fertile and highly suited for cultivation. Moreover, the mean annual rainfall of 1763 mm is favourable for intensive cultivation, specially of rice. The ethnographic evidence also supports the practice of abundant rice cultivation and mixed farming over the laterite deposit.
9. As the locations of the sites reflect their distribution close to the flood plain alluvium e. g. eastern part of the Karatoya and the nearly level Barind tract area, the fertile soil seems to have been the main attraction for pioneering settlers and their successors.
10. Although the mean annual rainfall of 1763 mm is quite high, irregularities in its distribution are occasional. For example, during 1873 west Barind tract received only 637 mm rainfall. They go dry during drought. It has been observed that tanks in the soft alluvial deposit can be dug quite easily. Besides, natural *bydes* (depression) would have been converted into tanks by constructing embankments on the sloping sides. In the case of existing tanks high ridges provide natural embankments on one or more sides.
11. Structures identified of the sites include both secular and religious buildings, the latter mainly *stupas*, *viharas* and monasteries. Burnt-brick was used extensively for building religious structures. The extensive use of burnt-bricks indicates affluent condition of the settlers. It reveals the plentiful availability of raw material i. e. clay for making bricks and fuel i.e. wood for the brick firing.
12. Ethnographic study in the area shows that about 90% house-walls are made of clay. This system of wall construction in domestic structures in Mahasthangarh region would have been a common practice in the past as well. Signs of mud-walls have been found at Wari-Bateshwar in NBPW level (Haque *et al.* 2000). Mud- walls have been reported from Mahasthan excavation also (Bernard 2001).
13. The settlement pattern shows three types of distribution arrangement viz. linear pattern along the rivers and *bils*, nucleated pattern in the close proximity of the citadel and dispersed type mostly away from rivers and citadel.
14. The inscriptional evidence of 3rd century BC, literary evidence of Hiuen Tsang (7th century AD) and archaeological data, e. g., the exotic gold-foil glass beads, sandwiched glass beads, Indo-Pacific glass beads, various kinds of semi-precious stone beads, elite wares like

NBPW, Rouletted Ware, Glazed Ware, large number of silver punch-marked and cast coins, massive burnt-brick structures, stone and terracotta sculptures and metal objects of bronze, copper and iron all indicate that Pundravardhana was a prosperous civilization.

15. A large number of Buddhist monasteries and Brahmanical temples bear testimony to the flourishing of Buddhism and Hinduism in the region. Although the antiquity of the known monuments goes back only to the Early Medieval, systematic excavation may also reveal Early Historic structures in the region. Hiuen Tsang in the early 7th century AD (639-645 AD) noticed 20 flourishing Buddhist monasteries and 100 Brahmanical temples.
16. The discovery of semi-precious stone beads, stone chips, cores, gold-foil glass beads, sandwiched glass beads, Indo-Pacific glass beads, Glazed Ware and Rouletted Wares indicates trade contacts of Mahasthan region with the other parts of the Subcontinent and also probably with Mediterranean region during Early Historic period. The inscriptional evidence and local legends show Pundranagara’s contacts with Sanchi and Ujjain in central India.

Scope for Further Research

In the absence of any previous systematic archaeological investigation in the area the present work should be seen as a preliminary endeavour. It has raised more questions than it can answer. However, below mentioned steps are needed to get a clearer picture of the early history of the region.

1. For understanding the culture of Early Historic and Early Medieval periods of the region the whole Barind tract (as a single geographic unit) i.e. parts of Rajshahi, Joypurhat, Dinajpur and adjoin parts of West Bengal namely West Dinajpur, Malda and Murshidabad districts should be explored at micro level.
2. Trial digging or section scraping should be carried out at selected sites to obtain the culture sequence of the region and know the antiquity of human settlement.
3. Detailed palaeohydrological and geomorphological work in the area using satellite imagery, GIS, and field studies as well as palaeobotanical and sedimentological analysis should be carried out to understand the evolution of the landscape.
4. Inscriptional and literary evidence should be considered in conjunction with the archaeological evidence for a proper understanding of the past settlement patterns.

APPENDIX

Master Chart Of Sites of Bogra District

SL. No.	Site	Area in hectare (ha).	Distance from the Mahasthan citadel in km if not otherwise mentioned.	Distance from river if not other-wise men-tioned (km).	Major finds.	Plausible identification of settlement.*	Cultural period: Early Historic (EH) and Early Medieval (EM). * *
1	Agomaji	3	21.5	1.5	Bricks and ancient ceramics	Religious and secular.	EM
2	Akrail	10	7.5	3	Bricks, ancient ceramics and T.C. balls	Religious (temple ?) and secular	EM
3	Arola: Arola Dhap	10	6.75	*Bil* bank.	Bricks, ancient ceramics, T.C. balls and NBPW	Religious (temple or *stupa*) and secular	EH to EM
4	Arola: Salban Rajar Bari	30	7.25	3.25	Bricks, ancient ceramics and T.C. balls	*Vihara* and secular	EM
5	Baghahali: Salban Rajar Kachari	4.86	5.5	*Bil* bank.	Bricks, ancient ceramics, T.C. animal and human figures (?)	Religious (*vihara* and temple) and secular	EM
6	Baghopara:	20	3.5	River bank.	Bricks, ancient	Temple and	EH

	Skandar Dhap				ceramics and red stone torso of a divine figure (Kushan influence)	secular	
7	Bamanpara: Gabtalir Dhap	0.14	2	2	Brickbats and ancient ceraamics	?	?
8	Bamanpara: Kanai Dhap	0.6	1.5	2	Bricks, ancient ceramics and T.C. plaques (Gupta period)	Religious	EH
9	Banavita: Sultaner Dargah	1.5	21	1	Bricks and ancient ceramics	Religious and secular	EM
10	Bansbaria: Bansbaria Dhap	0.09	25	River bank.	Bricks, ancient ceramics and T.C. plaques.	*Stupa*.	EM
11	Bara Saralpur Balai Dhap	0.03	1.5	2	Bricks, ancient ceramics and sculpture (Gupta period)	Religious	EH
12	Bara Saralpur: Bairagir Dhap	0.36	2.2	1.5	Bricks and ancient ceramics	Religious.	EM
13	Bara Saralpur: Failar Dhap	0.6	2.75	1.25	Brickbats and ancient ceramics	Religious	?
14	Bara Saralpur: Kumragari Dhap	0.16	3	600 m from *bil*	Brickbats and ancient ceramics	Secular (?)	?
15	Bara Saralpur: Panch Pirer Dhap	0.54	3	1.25	Brickbats and ancient ceramics	Religious	?
16	Barbakpur: Naudapara	4.5	6.50	River bank	Brickbats, ancient ceramics, NBPW and BSW	Secular	EH
17	Bhasu Vihar	5.4	5	0.5	Bricks, ancient ceramics, T.C. plaques, sculptures etc.	*Vihara*	EM
18	Bihar:Bihar Dhap	5.5	4	600 m and 800 m	Bricks and ancient ceramics	*Vihara*	EM
19	Bil Hamla: Masore Dhap	0.14	6	1	Bricks, ancient ceramics.	Religious	EM
20	Chakalma: Ghuchi Dhap	5	30	Canal bank 8	Bricks, ancient ceramics and T.C. beads	Religious (*stupa*) and secular	EM
21	Chak Deola: Deolar Dhap	5	34	1.5	Bricks and ancient ceramics	Religious (*stupa*) and secular	EM
22	Chala	5	36	3	Bricks and ancient ceramics	Religious (?) and secular	EM
23	Chanmua Haripur:Burir Than and Sannayasir Than	3	2.5	*Bil* bank	Brickbats, ancient ceramics and T.C. beads	Religious (?) and secular	?
24	Chanmua Haripur: Dolmancha	0.12	2.5	*Bil* bank	Bricks and ancient ceramics	Religious	EM
25	Chanmua Haripur: Sasti	0.07	2.5	*Bil* bank	Brickbats and ancient ceramics	Religious	EM

	Tala						
26	Chapachil: Chapachil Dhap	5.4	13	1	Bricks and ancient ceramics	*Stupa* and secular	EM
27	Chingashpur: Andhar Kota	0.36	90 m	*Bil* bank	Bricks and ancient ceramics	?	EM (?)
28	Chingashpur: Bismardan	0.14	200 m	*Bil* bank	Bricks and ancient ceramics	*Stupa*	EM
29	Chingashpur: Burir Bari	2.5	1.5	*Bil* bank	Bricks and ancient ceramics.	Religious and secular	EM
30	Chingashpur: Khulnar Dhap	0.33	1.25	1	Brickbats and ancient ceramics	Religious	?
31	Chingashpur: Kutir Dhap	0.06	70 m	*Bil* bank	Brickbats and ancient ceramics.	?	?
32	Chingashpur: Lizanar Dhap	7.5	1	150 m from *bil*.	Bricks and ancient ceramics	*Stupa* and secular.	EM
33	Chingashpur: Madarir Than	9	800 m	*Bil* bank.	Brickbats, ancient ceramics T.C. beads	Religious (*stupa*) and secular	?
34	Chingashpur: Padmar Bari	0.54	.5	*Bil* bank.	Bricks and ancient ceramics	?	EM
35	Chingashpur: Siddah Bari	5	600 m	*Bil* bank.	Bricks and ancient cramics	Secular.	EM
36	Chingashpur: Yogir Dhap	7.5	700 m	Bil bank.	Bricks and ancient ceramics	Religious (*stupa*) and secular	EM
37	Chilimpur: Berer Bari	0.28	13	3	Bricks and ancient ceramics	?	EM(?)
38	Chilimpur: Koter Bari	0.42	13	3	Bricks and ancient ceramics	Secular (?)	EM (?)
39	Chinal: Chinal/ Chilul Dhap	7.5	13	1	Bricks and ancient ceramics	Religious (*stupa*) and secular	EM
40	Dahapara: Dargapar	0.18	13	5	Bricks and ancient ceramics	Religious (*stupa* ?)	EM(?)
41	Dakshin Syampur: Chagal Naiddha	0.39	1.25	1	Bricks and ancient ceramics	Religious (*stupa* ?)	EM
42	Dakshin Syampur: Dhaniker Dhap	0.56	2	*Bil* bank.	Brickbats and ancient ceramics	*Vihara*	EM (?)
43	Daulatpur: Dolmancha	4.5	2.5	*Bil* bank	Bricks and ancient ceramics	*Stupa* and secular.	EM
44	Deogan: Devkunda	7.5	27	4	Bricks, ancient ceramics, cowries and T.C. balls	Secular	EM
45	Dhap: Dhaper Hat Dhap	4.5 (?)	17	River bank.	Brickbats and ancient ceramics	Religous (*stupa* ?) and secular	EM
46	Dharmapur: Jora Dhap	0.3	4	1.5 from *bil*	Brickbats and ancient ceramics	?	?
47	Dumargaon	7.5	15	4	Bricks, ancient ceramics, T.C balls and beads	Religious (*stupa*) and secular	EM
48	Erulia: Basu Bania Saudagarer Bari	7.5	10	3	Bricks and ancient ceramics	*Stupa* and secular	EM

49	Ghagurduar: Bulur Chawk	2.7	200 m	200 m	Brickbats, glass beads, semi-precious stone beads and ancient ceramics	Secular	EH (?)
50	Ghagurduar: Eidgah	0.07	150	400 m	Brickbats and ancient ceramics	?	?
51	Ghagurduar: Fakirpara (East).	4.5	250 m	300 m	Brickbats, ancient ceramics, T.C. balls and beads	Secular	?
52	Ghagurduar: Fakirpara (West)	6	250 m	350 m	Brickbats, ancient ceramics T.C. balls and beads	Secular	?
53	Ghagurduar: Juran Tala	0.14	250 m	450 m	Brickbats and ancient ceramics	Religious (*stupa* ?)	?
54	Ghagurduar: Khaliphapara	4	200 m	450 m	Brickbats, ancient ceramics T.C. balls and beads	Secular	?
55	Ghagurduar: Kumbara Dhap	0.02	100 m	Surrounded by *bils*	Brickbats and ancient ceramics	?	?
56	Gokarna: Gokarna Rajar Bari	5.25	16	1.25	Bricks, ancient ceramics and T.C. balls	Religious (?) and secular	EM
57	Gokarna: Gokarna Siva Temple	0.06	21.5	3.5	Bricks and ancient ceramics	Religious	EM
58	Goqul: Highway To Kakla Dighi	63	300 m	River bank	Bricks, ancient ceramics, T.C. balls, plaques, semi-precious stone beads and NBPW	Religious and Secular	EH to EM
59	Goqul: Lakshiminda-rer Medh	0.36	1.5	1	Bricks	Temple	EM
60	Goqul: Netai Dhopanir Dhap	0.45	1.5	600 m	Bricks and ancient ceramics	Religious (temple)	EM
61	Goqul: Pir Borhan Ali Majar	12	200 m	Moat bank.	Bricks, ancient ceramics, T.C. balls and part of stone pillars and door-sills	Religious and secular	EM
62	Goqul: Satya Pirer Vhita	0.05	1.5	800 m	Bricks and ancient ceramics	Religious	EM
63	Gorna: Gorna Dhap	7.2	9	1.25	Bricks, ancient ceramics, T.C. horse figures and cowries	Religious (?) and secular	EM
64	Hazrabari: Srikala Ara Dhap	1.5	2	685 m	Brickbats and ancient ceramics	Temple (?)	?
65	Hazradighi: Oza Dhanvantarir Bhita	1.5	3	2 and *bil* bank.	Brickbats and ancient ceramics	(?)	?
66	Hukmapur: Chander Dhap	0.34	4	1.25	Bricks, ancient ceramics and T.C. balls	Religious	EM
67	Hukmapur: Gonsayer Dhap	1.5	3	4.5	Bricks and ancient ceramics	Religious	EM

68	Jamgram: Shib Bari Dhap	4	24	1	Bricks, ancient ceramics, T.C. balls, beads and cowries	?	EM
69	Jarai	3.5	21	6	Bricks, ancient ceramics and T.C. balls	Religious (*stupa*) and secular	EM
70	Jora: Jora Rajbari	5	16	0.5	Bricks, ancient ceramics, T.C. balls and beads	Secular	EM (?)
71	Kalai: Kalai Rajbari	3.75	15	1	Bricks, ancient ceramics, parts of stone pillar and door-sill	Secular	EM
72	Kalyanpur: Hindu Para	3	10	3	Brickbats and ancient ceramics	Religious (?) and secular	?
73	Kaichar	6	13	3	Bricks and ancient ceramics	Secular	EM
74	Kanar	7	14	4	Brickbats and ancient ceramics	Secular	?
75	Katham: Baghicha Dhap	10.5	32	1.5 from canal and 6 from river	Bricks, ancient cramics, T.C. balls and beads	Religious (*stupa*) and secular	EM
76	Kazipur: Dheep	6	1.75	630 m	Brickbats and ancient ceramics	Religious (?) and secular	?
77	Khadash: Khadash Rajbari	4.5	26	2	Bricks, ancient ceramics, T.C. balls, disc and plaques	*Stupa* and secular	EM
78	Khanpur: Khanpur Dhap	3.75	23	4	Bricks, ancient ceramics, T.C. balls and beads	Religious (*stupa*) and secular	EM
79	Khengasher	0.002	28	2	Bricks and ancient ceramics	?	EM
80	Kholash	7.5	18	1	Brickbats, ancient ceramics, T.C. balls and beads	Secular	EM
81	Kosas	12.5	31	River bank.	Bricks, ancient ceramics and T.C. balls	Religious (*stupa*) and secular	EM
82	Mahasthan: Govinda Bhita	7.5	100 m	River bank.	Bricks, NBPW, RW, semi-precious stone beads and glass beads	Religious (?) and secular	EH
83	Mahasthan: Mahasthan Citadel	208	0	River bank.	NBPW, BSW, RW, ancient ceramics semi-precious stone beads, glass beads, punch-marked coins, T. C. plaques, stone sculptures, bricks etc.	Fortified city	EH to EM.
84	Malgram: Sultan Saheber Dargah	6	12.5	1.25	Bricks, ancient ceramics and T.C. balls	Religious (*stupa*) and secular	EM
85	Mathura: Dinga Duba	0.3	700 m	Surround-ed by *bil*	Bricks and ancient ceramics	Temple (?).	EM
86	Mathura: Godar Bari	0.42	1	*Nala* bank	Several brick walled rooms, ancient ceramics and a Brahmi inscriptionn	Temple (*chityagrah* ?)	EM
87	Mathura:	40	200 m	Citadel	Bricks, Semiprecious	Religious (*stupa*),	EH and EM

	Mathura-Palash bari			moat bank	stone beads, Stone debitage and core, Glass beads, NBPW, BSW and ancient ceramics	secular and semipreciousstone beads industry site	
88	Palashbari: Dhata Tarar Dhap	0.08	800 m	2	Brickbats	Religious (?)	?
89	Palashbari: Ghon Para Dhap	3.5	1.5	*Nala* bank	Brickbats and ancient ceramics	Religious (*stupa*) and secular	?
90	Palashbari: Kakla Dighi Dhap	30	300 m	1.5	Bricks, ancient ceramics, BSW.and NBPW	Secular and. religious (?)	EH and EM
91	Palashbari: Khanser Dhap	12	1.5	1.25	Bricks, ancient ceramics, T.C. balls, semiprecious stone beads	Secular	EM
92	Palashbari: Naria Dhap	1.7	800 m	2	Brickbats, ancient ceramics and BSW	Religious and secular.	EH
93	Palibari: Mangal Kot	0.21	1.25	*Bil* bank	Bricks, ancient ceramics and T. C. sculptures	Religious	EH
94	Panai: Panai Dhap	0.42	21	4	Brickbats and ancient ceramics	Religious (?)	?
95	Panchgaon: Dhantala	0.36	10.5	3	Bricks and ancient ceramics	Religious (?)	EM
96	Panchgaon: Uchubari	15	10	3	Bricks and ancient ceramics.	Secular.	EM
97	Panchgaon: Uttar Para Mazar	3	10	3	Brickbats and ancient ceramics	Religious and secular.	?
98	Panch Deuli: Panch Deuli Dhap	6	40	2	Bricks and ancient ceramics	Religious (*stupa*) and secualar	EM
99	Panartica: Nishanghata	0.09	3.5	River bank	Bricks and ancient ceramics	*Stupa*	EM
100	Pirapat: Burir Than	0.14	6	*Bil* bank	Brickbats and ancient ceramics	Religious(?)	?
101	Pirapat: Ghopa Dhap	5	6	*Bil* bank	Bricks and ancient ceramics	*Stupa* and secular	EM
102	Pratappur: Panch Pirer Dhap	0.81	19	2	Bricks and ancient ceramics	Religius (?)	EM(?)
103	Ramsahar	6	2.5	1	Bricks, semiprecious stone beads, glass beads, NBPW, BSW and RW and ancient ceramics	Secular	EH
104	Ramsahar: Khamar Bari	10	2	1.25	Bricks and ancient ancient ceramics	Religious and secular	EM
105	Rajakpur: Chand Saudagarer Bari	2.25	3	*Bil* bank.	Brickbats and ancient ceramics	Secular	?
106	Rajakpur: Dhana Bhandar	3	3.5	*Bil* bank	Brickbats and ancient ceramics	S*tupa* and secular	?
107	Rajkpur:	3	5	*Bil bank*	Brickbats and ancient	*Stupa* and secular	?

	Jhiltala				ceramics		
108	Rajakpur: Singhinather Dhap	6	4	*Bil* bank	Bricks and ancient ceramics	Religious (*stupa* or temple)	EM
109	Rajbari Mukunda	33	36	2	Bricks, ancient ceramics and stone sculptures	Secular (?)	EM
110	Sabrul: Nagar Para	9	17	*Bil* bank	Bricks and ancient ceramics	Religious and secular	EM
111	Sabrul Bara Mandal Para	7.5	17	*Bil* bank	Bricks and ancient ceramics	Secular	EM
112	Santa: Santa Dhap	0.10	25	2	Bricks and ancient ceramics	*Stupa*	EM
113	Sajapur	14	19	River bank	Bricks, ancient ceramics, T.C. balls, beads, horse figure	*Stupa* and secular	EM
114	Satshumulia: Gazi Kalur Bari	0.11	3	200 m	Bricks, T.C. balls, beads and ancient ceramics	?	EM
115	Sekendrabad: Kanjir Hari Dhap	1.53	3	2	Bricks and ancient ceramics	*Vihara*	EM
116	Sekendrabad: Lizanir Dhap	10	1.5	1.5	Bricks and ancient ceramics	*Stupa* and secular	EM
117	Sekendrabad: Malinir Dhap	16.25	2.25	2	Bricks and ancient ceramics	*Stupa* and secular	EM
118	Sekendrabad: Mal Pukuria Dhap	0.18	3.25	2.25	Bricks and ancient ceramics	Religious (*stupa*)	EM
119	Sekendrabad: Prachir Dhap	0.68	3	2	Brickbats and ancient ceramics	?	?
120	Sekendrabad: Sur Dighi Dhap	0.45	2.5	2	Bricks and ancient ceramics	Religious (*stupa* or temple)	EM
121	Sekendrabad: Yoginir Dhap	0.08	2.5	2	Brickbats and ancient ceramics	*Stupa*	EM
122	Serua: Dhar Mokam and Sher Mokam	60	33	River bank	Bricks, T.C. balls, horses, and ancient ceramics	*Stupa* and secular	EM
123	Sirajnagar	6	43	2	Bricks and ancient ceramics	Secular	EM
124	Solagari: Solagari Rajar Bari	2.25	15	1	Bricks, ancient ceramics and T.C. plaques	Religious (?) and secular	EM
125	Tengra: Banshi Chapar	0.13	3	650 m from *bil*	Brickbats and ancient ceramics	?	?
126	Tengra: Batpara Dhip	1	3	150 m from *bil*	Brickbats and ancient ceramics	Secular	?
127	Tengra: Bhagur Dhap	0.2	3.5	4.75	Bricks, and ancient ceramics	Religious (temple ?)	EM
128	Tengra: Dulur Bari	1.44	3	Surrounded by *bil*	Bricks and ancient ceramics	?	EM
129	Tengra: Kangra Chapar	0.2	3	600 m from *bil*	Bricks and ancient ceramics	?	EM
130	Tengra: Kutir Ara Dhap	0.9	4	2	Bricks, and ancient ceramics	?	EM
131	Tengra:	3	3.5	600 m from	Brickbats and ancient	Secular	?

	Madya Para Majsid Dhap			*bil*	ceramics		
132	Tengra: Manner Dhap	0.3	3.25	5	Bricks and ceramics	Religious (*stupa*)	EM
133	Tengra: Nara Dhap/ Narapatir Dhap	0.39	3.5	4	Bricks and ancient ceramics	*Stupa*	EM
134	Tengra: Sannyashir Dhap	3.15	3.5	600 m from *bil*	Bricks and ancient ceramics	*Vihara*	EM
135	Zamur: Zamur Dhap	0.55	33	1	Brickbats and ancient ceramics	Religous (?) and secular	?

* The plausible identification of sites as religious and secular in most of the cases mainly on the basis of a few excavated sites would remain nothing more than guess. The issue of identification can be settled down satisfactorily only on the basis of adequate artifacts from horizontal excavations.
Mounds associated with a large number of bricks have been identified as religious structures e. g. *stupa*, *vihara* and temple. Some of them like Govinda Bhita, Gogul Medh, Bhasu Vihar and Godar Bari have been exposed by excavation in the area. Sometimes shapes of mounds i.e. circular have been considered as stupa, square and rectangular as *vihara.* Settlements spread over a large area on plain flat high land with low occurrence of bricks/brickbats have been considered as a secular settlements.

** Early Historic (EH) period has been assaigned on the basis of diagnostic type of artifacts i.e. NBPW, BSW, RW, T. C. plaque, stone sculpture and punch-marked coin,. Identification of Early Medieval (EM) period has been done on the basis of large size brick and clay mortar. Although large size brick and clay mortar could be an indication of Early Historic period too, in the absence of other Early Historic diagnostic type artifacts, sites have been assigined to Early Medieval period. It is worthwhile to mention that some of the Early Historic sites might have continued upto Early Medieval period but at present, the paucity of data do not help us to settle the issue.

? Not determined.

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Early Historic Balathal: An Artefactual Approach

Kurush Feroze Dalal

Introduction

Indian archaeology, since its inception, has undergone numerous crises alternating with periods of normalcy and elation. Almost the entire history of archaeology in India is one of direct government supervision, "…from 1861 until now, barring a few exceptions, archaeology has remained a government preserve (Sankalia 1979:3)". Most areas of interest, in the early phase of archaeological research in India were located by chance (in the 19th century), e.g., Sanchi, Sarnath and Ajanta, and in the early years of the 20th century, e.g., Harappa and Mohenjo Daro, among others. Intensive research was carried out in areas adjoining these sites. Almost no systematic state/province-wise, or village-to-village surveys were carried out. Here two genuine limitations may be considered- (a) India was a vast region with innumerable sites scattered all over, too enormous a spread to be covered in a short definitive period. (b) For all the scientific methods brought to bear, archaeological discoveries even today are more often than not found by luck and chance.

The extensive archaeological research carried out in the first half of the 20th century was limited, in great measure, to the western and north-western areas of undivided India and was devoted to the Indus/ Harappan civilisation (Mackay 1935, 1938; Marshall 1931, 1951, 1960; Majumdar 1934; Vats 1941; Stein 1942). As a result of the Partition in 1947 almost all the Harappan sites were left on the 'wrong' side of the border. This inspired the Indian archaeologists to conduct intensive investigations. This led to the discovery of a large number of sites not only of the Harappan period but also of Palaeolithic, Mesolithic, Neolithic, Chalcolithic, Megalithic and Historical periods. In the 1950s and 60s a huge corpus of data based on explorations and (mainly small scale) excavations was thus brought to light but unfortunately was published mostly only in the form of brief reports in the Indian Archaeology-A Review (*IAR*), the journal of the Archaeological Survey of India (ASI). This period also saw the rise of government funded/aided departments of archaeology in various universities, e.g., Deccan College Post-graduate and Research Institute, Pune; Maharaja Sayajirao University, Baroda; Allahabad University, Allahabad; and Banaras Hindu University, Varanasi. It seemed as though a new purpose had been discovered, which in turn became the motivating force in attempting to draw up a credible chronology of India, to link continuously the Prehistoric, Protohistoric and Early Historic periods of the Indian past, a number of sites like Nasik (Sankalia *et al*. 1955), Nevasa (Sankalia *et al*. 1960), Maheshwar and Navdatoli (Sankalia *et al*. 1958), Hastinapura (Lal 1956), Kalibangan (Lal and Thapar 1967), Ujjain (*IAR* 55-56: 19; 56-57: 20-28), and others were excavated and some fully published.

These discoveries of hitherto unknown Chalcolithic cultures coupled with the newly discovered (on the Indian side of the border) rash of Harappan sites led to a large-scale exodus from the existing trend of research to an obsession with Protohistory. This obsession led to an attempted cultural correlation and spatio-temporal positioning of the same within the known framework of cultural sequences. Incidental to these Chalcolithic discoveries was the discovery of cultural material datable (then) to approximately to between 200 BC and 200 AD, at almost all of the excavated and explored sites where it was found as an overlying deposit. As the obsession of the day was Protohistory, these Early Historic deposits were duly mentioned, minimally described and then quickly forgotten, thus leaving an enormous vacuum in the cultural sequence of the sub-continent.

The Excavations at Balathal and the Problem of Dating Early Historical sites

In January 1994 the Deccan College, Pune, began excavations at the Ahar Culture site of Balathal (Misra *et al*. 1995, Misra *et al*. 1997). Balathal (24° 43' N: 73° 59' E) lies in the Vallabhnagar Tehsil of the Udaipur District of Rajasthan (fig. 1).

Seven seasons of excavations (from 1994 to 2000) (fig. 2) revealed a large Early Historical deposit overlying the Ahar levels. These Early Historical deposits (layers 1 to 4) (fig. 3) were preliminarily dated to the period 200 BC to 200 AD since there was supposedly no earlier advent of the Early Historical in Rajasthan. Subsequent research and analysis though revealed very surprisingly that the site belonged to the (late) 5th and 4th centuries BC (Dalal 2001: 215-6). This was further confirmed by a series of C-14 dates (Table 1) (Dalal 2001: 215).

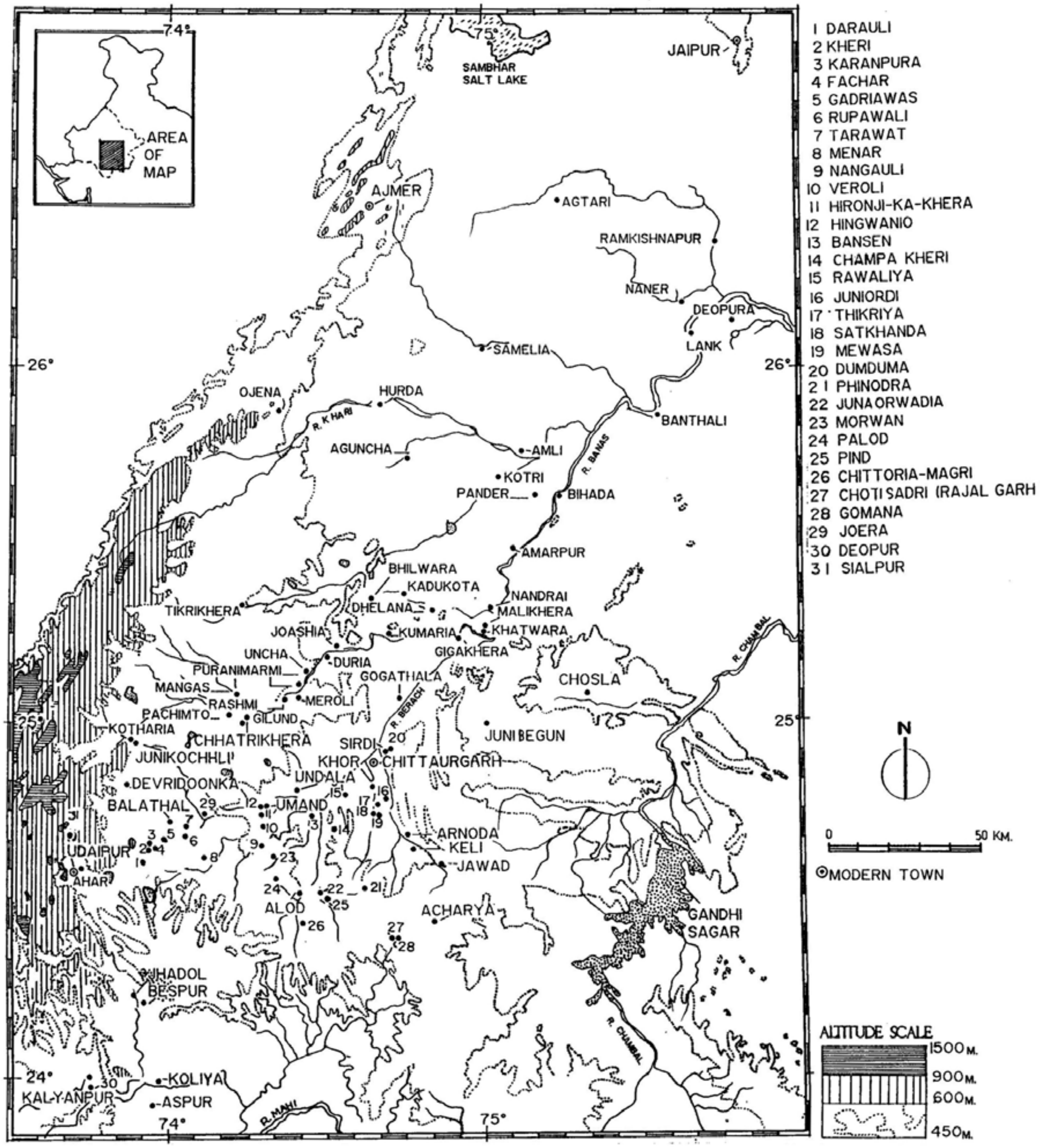


Fig. 1: Map showing the location of Balathal

Table 1. C-14 dates from the Early Historic strata.

Sr. No.	Lab. No.	Tr.	Ly.	Depth in metres	Date in BP (Half-life 5730)	Date (AD/BC)	Calibrated (Summary)
01	PRL-1848	C	2	0.50	1820±70	130 AD	
02	BS-1567	OA2	3	1.38	1900±90	50 AD	19 (100) 224 AD
03	PRL-1841	HX2	3	0.84	2110±60	160 BC	
04	PRL-2403	A3	3	1.05	2230±90	280 BC	
05	BS-1566	A	3	1.44	2280±80	330 BC	405 (379) 208 BC
06	PRL-1849	C	3	0.90	2290±70	340 BC	
07	PRL-1983	A	4	1.77	2350±80	400 BC	
08	PRL-1850	C1	2	0.47	3530±70	1580 BC	

09	BS-1800	C4	1	0.31	3120±120	1170 BC	
10	BS-1781	C4	3	0.75	7180±180	5230 BC	

(Note: It is obvious that the two dates from Tr. C4 and the date from Tr. C1 are in no way ascribable to the Early Historic and are in fact Chalcolithic dates and must mean an intrusion of earlier charcoal. These dates have thus not been taken into consideration whilst ascribing chronological limits to the Early Historic at Balathal.)

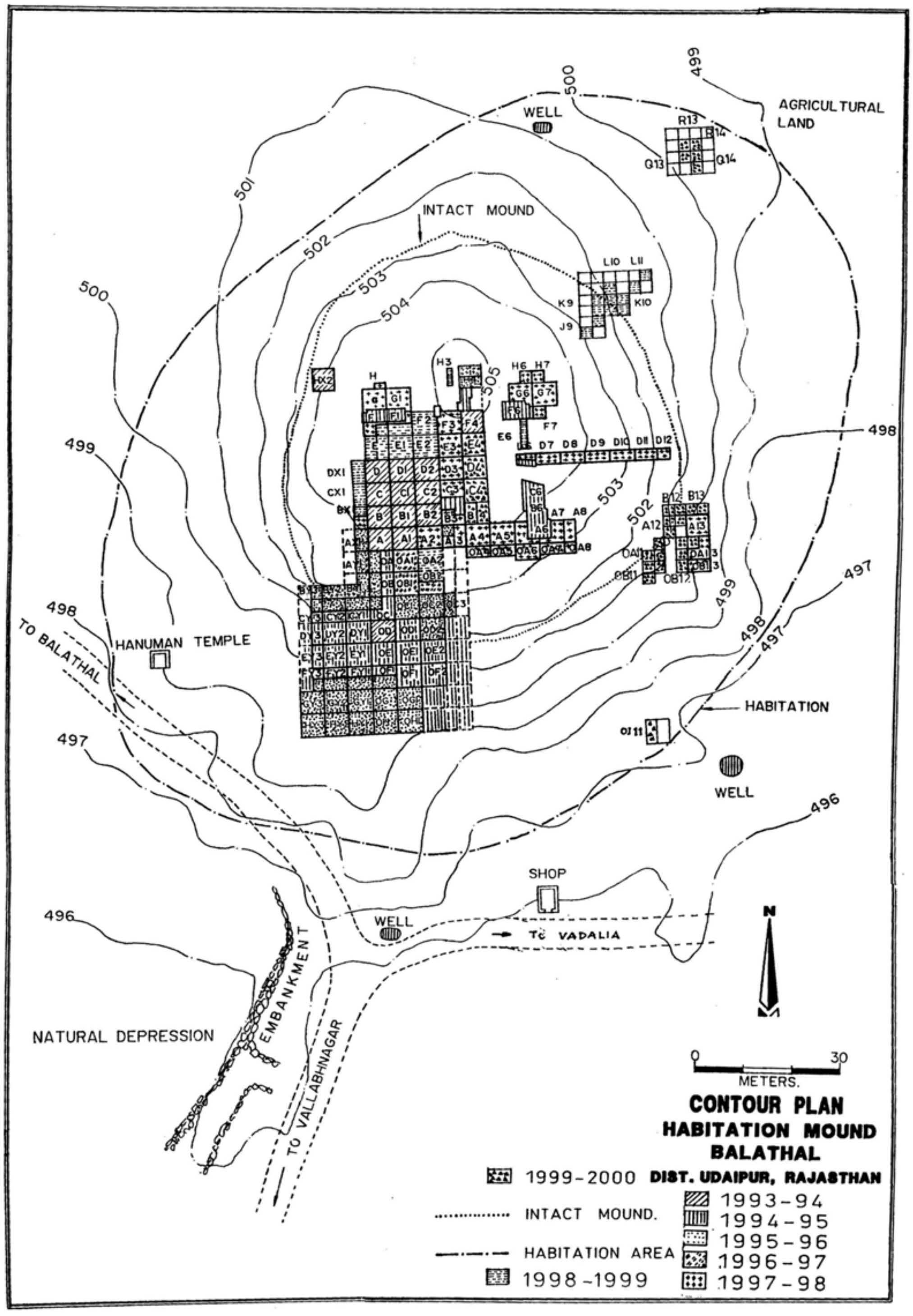


Fig. 2: Contour Map of the site of Balathal with year-wise trench demarcation

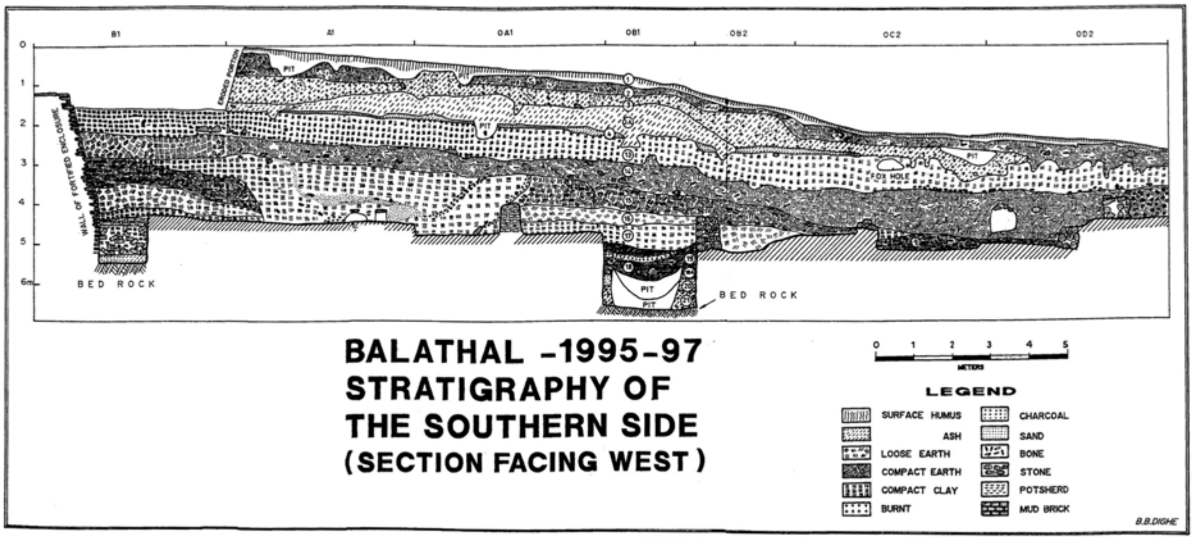


Fig. 3: Stratigraphy at Balathal

The main reason for the mistaken identity was that whereas northern India and even northern Rajasthan seemed to yield a continuous sequence (OCP/ B&RW/ PGW/ NBPW/ Sunga - Kushana/ Gupta), the entire early Iron Age sequence appeared to be absent in this quarter.

Most of the identification of various chronological levels at sites was based on the study of ceramic assemblages. The identifying markers used to make spatio-temporal distinctions in the case of Early Historical sites were 'table-wares' associated with each period. The main fallacy here was that whilst these distinctions were apparent in the large urban centres of the Ganga Valley the same could not be said of the rest of Northern and Central India especially with reference to the rural centres.

Since the rest of the ceramic assemblage (i.e. the utilitarian wares) of northern, central and western India seem almost uniform from 600 BC to 600 AD there was a serious problem in correctly dating Early Historical sites. Thus all sites that lacked distinct table-wares, coins or writing were assigned to arbitrary periods based on 'guesstimation' and dateable sites in the vicinity. This was an incredibly arbitrary and unscientific method.

Thus taking into account the shortfalls of the Ceramic Approach it was decided to tackle this problem from a purely artefactual angle to see if any traces of diffusion and differentiation were possible. Thus the method chosen was 'An Artefactual Approach' (Dalal 2001: 4-5).

The Artefactual Approach

Keeping in mind the needs as well as the limitations of this study a step-by-step methodology was developed to optimally tackle this problem. The steps were:

1. Systematic cataloguing of all the Early Historic artefacts from the site of Balathal.
2. Understanding their contextual positioning.
3. Physically identifying their constituent elements.
4. Tracing the raw material sources for the same and the routes of their acquisition.
5. Comparing the material from Balathal with that recovered from other excavated sites in and around the study area.
6. Comparing the material from Balathal with artefacts excavated from sites dated to the same temporal bracket from northern and western India.
7. Tracing the possible routes of movement within the study area while trying to identify a series of settlements falling on these routes of migration/trade.
8. Creating on the basis of the above mentioned methods a comparative artefactual chronology for this period in the broader perspective of the Early Historic period in India.

Comparative analysis of the artefactual assemblage from Balathal with those from other Early Historic sites

Comparative analysis serves as a base on which one can weave a tapestry of contact, dissemination and lifestyle, thus displaying a detailed picture of the geographical distribution or spread of the artefacts and artefact types. This goes further to give us an idea of the similarities in the artefactual assemblages from these sites and those from Balathal and the interactions Balathal had with these other contemporary sites.

Therefore, the comparative analysis has shed light not only on the repertoires of the craftsmen of that time but also on the peculiarities, trends and tastes, technology, resources, interactions and the general lifestyle of the people of Balathal in particular and of the other contemporary sites.

The comparative analysis of the artefacts from Balathal has been done on a site-wise basis. The artefacts from Balathal have been compared with those from collections from other Early Historic sites in an attempt to locate similarities or parallels. This not only gives an idea of the types of objects of daily use that were prevalent in that period but also shows up chronological markers, which help in establishing a chronology. Establishing artefacts as possible markers of chronology is one of the primary aims of the study. The absolute lack of hitherto defined comparative chronological markers as well as the indifferent occurrences of Carbon samples for C14 dating have left a void in the identification of specific excavated strata vis-à-vis their temporal position at many excavated sites. Therefore, the identification of specific artefact types as cross-cultural temporal markers becomes all the more important. For example, today a Harappan site can be positively identified purely on the basis of its ceramics and its artefactual type fossils like seals, long barrel carnelian beads, typical figurines, etc., and its specific size of bricks.

Here an attempt has been made to build a similar set of artefactual markers to serve the same purpose as far as the Early Historic period is concerned.

To simplify an otherwise cumbersome data, the data has been presented in a tabular form.

Table 2. Early Historic Sites and their probable Artefactual Markers

SITE	**Pre-Mauryan (600-300BC)**	**Mauryan (321-150BC)**	**Mauryan–Sunga (150-100BC)**	**Sunga (100BC-50AD)**	**Kushana (50-200AD)**	**Not Specific**
Ahar		Period IIa 1, 6, 7, 4, J			Period IIb G	Period Ib/Ic (Chalcolithic) D2, H1, H2, H3, F
Bagor						Phase III 600 BC to 200 AD 1
Bairat						J
Iswal						From Surface Explorations 3
Nagari		Period I	Period II (Sibi)	Period III (Malwa)	Period IV (Kshatrapa)	Context Unknown 1
Rairh		1, 6, B, H1, H2, H3, J				
Sambhar						Mauryan(?) B, H3
Dhatwa						5th century BC to 4th century AD C
Dwarka			Period I	Period I	Period II	MEDIEVAL (Period III) 5, I

Nagara	Period I J	Period II J	Period II	Period II/III (Kshatrapa) K, J	Period III K, D2	Period IV (14th *c*. AD) 5, I
Timbarva	Period I 1, 2, F	Period I 1, 2, F	Period I 1, 2, F	Period II 1, G	Period II 1, G	
Avra	Period III 1, J	Period III	Period III	Period III	Period IV	
Kakrehta	Period IV J, D	Period V 1, 2, F(Double), G, I, J, K	Period V 1, 2, F(Double), G, I, J, K	Period V 1, 2, F(Double), G, I, J, K	Period VI H2	
Kayatha	Period IV D2, F, G	Period IV D2, F, G	Period V G	Period V I	Period V I	
Maheshwar & Navdatoli	Period IV	Period IV G	Period IV/V	Period V 2, 6, A, J	Period V	Surface/Non-specific A, I
Nagda	Period II D2	Period III 1, D2, F, G, J				
Tripuri	Period II 1, D2, F, G	Period III 1, A	Period IIIA 1	Period IV	Period IV	
Ujjain		Period II 2, A, D2, F, G		Period III	Period III	
Ahichchhatra	Period I	Period II 1, 2, 4, A, D, D1(Citrine), H2, L	Period II/III 1, L		Period IV/V/VI L	
Atranjikhera	Period IVC 1, 2, 4	Period IVD 1, 2, 4, D, H1, H2, H3	Period IVD 1,2, H1, H2, H3	Period IVD	Period V	
Bhita	Period I G	Period II 1				Period IV (Gupta) 1, J
Hastinapura	Period III 1, 2, 3, D, H3	Period III 1, 2, 3, D, H3		Period IV 7, K	Period IV 7, K	Period V (1100-1400AD) I
Kausambi	Period IIB/III 1,2, 6, 4, A, D,	Period III D1, G, H1, H2	Period III D1, G, H1, H2	Period III D1, G, H1, H2	Period III (Sub-Period VIII) I	
Kumrahar		Period I 1, 2, A	Period II 1, 2, A, D	Period II 1, 2, A, D	Period III	Period IV (300 – 500 AD) 6
Pataliputra	Period I 2, 4	Period I 2, 4	Period II A	Period II A	Period II A	
Rajghat	Period IB/IC 1, 2	Period II	Period II		Period III D, D (Crystal), H1, H3	
Sonkh	Period II 1, 3, 6, 7, B, D2, G, J, L	Period II 1, 3, 6, 7, B, D2, G, J, L	Period II 1, 3, 6, 7, B, D2, G, J, L	Period III 7, D, G,, J. L1	Period IV/V B, D, D2, G, H1, H2, J	Gupta 5, K
Sonpur		Period II 1, 2, 6, A, D, F, G		Period III 1, G, J		
Sravasti	Period I 4	Period IIA/B 2, 3	Period IIC			Period III/ Un-stratified I/D

Tilaura-kot	Period I 1, 2, 6, 4, A, D, H1, H2, H3, H4, J	Period I 1, 2, 6, 4, A, D, H1, H2, H3, H4, J				
Vaisali (1)	Period IA	Period IB 1, D	Period II 2	Period II	Period III	
Vaisali (2)		Period II 1, 2, 4, D, F, L	Period III 1, D, F, H	Period III	Period III	
Rupar	Period III 1, 2, A	Period III/IV	Period IV 7	Period IV 7	Period IV	
Taxila	Period I	Period II/III 1, 2, A, D, D(Crystal), F, F(Double), G, H3	Period IV	Period V (Scytho-Parthian) 7, D, D2	Period VI H1	B
Taxila (Sirkap)		Period II H1				
Kaundinya-pura	Period II	Period III D, D2, J		Period IV (Satavahana) D2, G, J	Period V	
Kolhapur			Period I (Pre-Satavahana)	Period II (Satavahana) D, J	Period II (Satavahana) D, J	
Nasik		Period IIA 1, D2, F, G, H3, J	Period IIB 1, D, F, J	Period IIB 1, D, F, J	Period III (Roman Contact) F, G	Muslim Maratha I
Nevasa			Period IV J	Period IV/V J	Period V I	Period VI (Bahamani) I, K (Surface)
Pauni		Period I A		Period II	Period III (Kshatrapa – Satavahana)	
Prakash	Period II 1, 2, 6, D, F, J	Period II 1, 2, 6, D, F, J	Period III D2, G, J	Period III D2, G, J	Period III D2, G, J	Period IV (500–1200 AD) I

Key to the Table

1 = Pear shaped pots
2 = Carinated pots with inverted tapering rim and rounded base
3 = Fine Grey Ware dishes with central stamp
4 = Spouted basins in Red Ware
5 = Bell shaped lid
6 = Ink pot lid
7 = Votive tank with lamplets on rim

A = Copper cast coin of elephant and hill type
B = Iron Adze
C = Iron hoe/ploughshare blade
D = Hexagonally faceted bitruncated crystalline bead (Amethyst/Citrine/Crystal)
D1 = Irregularly faceted crystalline pendant (Citrine/Crystal)
E = Faceted crystal bicone bead (Crystal)
F = Terracotta headscratcher
G = Terracotta skinrubber
H1 = Globular carnelian bead with dots etched in white
H2 = Globular carnelian bead with a band of intersecting pentagons etched in white
H3 = Biconical carnelian bead with a band of intersecting pentagons etched in white
I = Plain and appliquéd glass bangle fragments
J = 4-legged quern
K = Rotary quern
L = Handmade terracotta female figurine
L1 = Moulded terracotta female figurine

(Note: The Ceramic data in this Table has been compiled by Dr. Abhijit Dandekar (2001) as part of his Ph.D. dissertation.)

Comparative chronology vis-à-vis: Rajasthan

At the present stage it is very difficult to propose a comparative chronology for Rajasthan. The Early Historic sites excavated either belong to a much earlier period [as is the case at Noh (*IAR* 58-59, 62-63, 63-64, 64-64, 66-67, 68-69) and Jodhpura (Chakravarty and Srivastava 1985: 147-9, 167-73)] or are much later [as is the case at Bhinmal (Agrawala 1955) and Rangmahal (Rydh 1959)]. The sites with a similar repertoire of artefacts have

either been excavated on a very small scale [as at Ahar (Sankalia *et al*. 1969)] or have yet to appear in report form [as is the case with Nagari (*IAR* 62-63, Bhandarkar 1920) and Sunnari (Sharma and Singh 1977: 120-3)].

What can be said on the basis of the data obtained from the excavations at Balathal is that the region we know today as Mewar was a land almost devoid of any permanent settlements during the early phase of the Iron Age in India. It was also most probably untenanted during the Janapada period (the 6th century BC) and was populated seriously, for the first time, by settled agro-pastoralists only around 450/400 BC.

The only site, which has yielded data similar to that from Balathal, is the site of Rairh (Puri 1940). But even here the analysis of the data is extremely difficult as the excavation is not reported in much detail and the dating is based on artefacts found prior to the excavation (Puri 1940: 39). At the most one can say that both Rairh and Balathal were co-extant during the same period and show similar artefactual trends.

The general conclusion drawn solely on the basis of the analysis of the Balathal artefacts is that once populated, southeastern Rajasthan became an important region producing iron, finished iron goods and leather[1]. It also became a major player in trade between the northern reaches of the Nanda and Mauryan Empires and the province of Avanti and through it central India. Trade also saw influences from the Mathura region vying with those from Avanti (Dalal 2001: 272-3).

Major activities were probably heavily curtailed by the invasion of the Indo Greeks who in all probability settled the tribe of the Sibis [also known as the Sivis or Siboi (Greek)] at Madhyamika (Nagari) after their successful conquest of the city (Tarn 1951: 170). This is substantiated by the fact that in Period IIB the site loses its importance and exists only as a small farmstead.

Comparative chronology vis-à-vis: Northern and Central India

The comparative chronology of Balathal vis-à-vis Northern and Central India is a bit complicated. To understand the artefactual co-relations one has to first review the entire chronology of the Northern Black Polished Ware (NBPW). Almost all the sites in the Ganga valley that yield NBPW have their lowermost horizon automatically dated to the 6th century BC due to the dating of the lowermost levels of the NBPW at Hastinapura by Lal (1956:12) to the 6th century BC. This was done by Lal on the assumption that the overlying (Sunga/Kushana) deposit was of the 1st century AD and thus the six metres of deposit below had to be at least six hundred years older. All the subsequent excavations used this lower limit, irrespective of the size of their deposits and any other datable materials. Thus we have levels that are labelled Mauryan and those below them Pre-Mauryan/600-300 BC. Thus we have almost no excavated material that has thus far been specifically assigned to the reign of the Sisunagas or the Nandas.

Subsequently a number of sites had their strata yielding NBPW dated by C-14 dating. The results all seem to give a much later date than that postulated by Lal at Hastinapura. The (uncalibrated) dates are given in Table 3.

Table 3. Dates of NBPW levels from selected sites in Northern India (*after* S. B. Roy of the Indian Chronological Institute, New Delhi).

1. Atranjikhera	460 BC	
2. Kausambi	435 BC	
3. Kayatha	430 BC	
4. Rajghat	490 BC	
5. Rupar	415 BC	
6. Ahichchhatra	410 BC	(S.B. Roy 1975: 84).

Surprisingly all these dates point to a date no earlier than the 5th century BC for the NBPW, thus leaving us with the piquant problem of assigning the NBPW not to the 6th century BC (or earlier) but probably to the Sisunagas and their immediate predecessors, the scions of Bimbisara who ruled over Magadha in the 5th century BC.

Now that the problem of the Chronology of NBPW has been dealt with, we can turn our attention to the artefactual assemblage from Balathal.

[1] The evidence of leather production consists of the large no. (51) of iron 'rapis' or cobbler's knives. No other site excavated in the sub-continent to date has yielded more than one! Also the site has yielded osseous remains in numbers far greater than normal (Dr. Thomas of Deccan college says at Balathal 80% of total fauna belong to cows and sheep). He feels the inhabitants were Pastro-agricultural and not Agro-pastoral. Thus the animals, their excessive bones and the rapis point only towards leather manufacture as the rapi has exclusively been used by cobbles all over India and continues to remain so even today

The ceramics from Balathal are almost completely mirrored at Hastinapur III (Dandekar 2001) and with the ceramic assemblages of corresponding sites from the Ganga valley. Ceramic markers common to both sites include pear shaped pots in Red Ware, carinated pots with inverted tapering rim and rounded base in Red Ware and Fine Grey Ware, Fine Grey Ware dishes, Black & Red Ware dishes, Black Slipped Ware dishes and sherds of NBPW. Similar vessels are seen in the pre-Mauryan levels at Bagor (Misra 1973), Rairh (Puri 1940), Avra (Trivedi 1963), Tripuri (Dikshit 1955), Ujjain (AARADG 1940, *IAR* 56-57), Atranjikhera (Gaur 1983), Kausambi (Sharma 1960), Kumrahar (Altekar and Mishra 1959), Pataliputra (Sinha and Narain 1970), Rajghat (Narain and Roy 1976, 1977), Sonkh (Hartel 1993), Tilaura-kot (Mitra 1972), Vaisali (Deva and Mishra 1961; Sinha and Roy 1969), Rupar (Sharma 1953) and Prakash (Thapar 1967). They are also seen in the Mauryan levels from Ahar (Sankalia *et al*. 1969), Kakarehta (Sharma and Mishra 1992), Nagda (Banerjee 1986), Tripuri, Ujjain, Ahichchhatra (Ghosh and Panigrahi 1946), Atranjikhera, Bhita (Marshall 1915), Kausambi, Pataliputra, Sonkh, Sonpur (Sinha and Verma 1977), Sravasti (Sinha 1967), Tilaura-kot, Vaisali, Rupar, Taxila (Marshall 1951), Nasik (Sankalia and Deo 1955) and Prakash (see Table 2).

Artefacts similar to those seen at Balathal are seen in the pre-Mauryan levels at Avra, Nagda, Tripuri, Ujjain, Kakarehta, Hastinapura (Lal 1956), Kausambi, Pataliputra, Rajghat, Sonkh, Tilaura-kot, Vaisali, Rupar, Taxila (Beck 1941), Dhatwa (Mehta and Chowdhary 1975) and Nagara (Mehta 1968) Selected artefacts from Balathal match those seen in the Mauryan levels from Ahar, Rairh, Sambhar (Sahni 1939), Avra, Kakarehta, Kayatha (Ansari and Dhavalikar 1975), Maheshwar and Navdatoli, Nagda, Timbarva (Mehta 1955), Tripuri, Ujjain, Ahichchhatra, Atranjikhera, Bhita, Hastinapura, Pataliputra, Rajghat, Sonkh, Sonpur, Sravasti, Tilaura-kot, Vaisali, Rupar, Taxila (Beck 1941; Ghosh 1948), Nagara, Kaundinyapura (Dikshit 1968), Nasik, Pauni (Deo and Joshi 1972) and Prakash (see Table 2).

These specific artefacts used as type fossils include terracotta headscratchers (fig. 4), terracotta skinrubbers, 4-legged querns, coins of the elephant and hill type, hexagonally faceted bitruncated beads of amethyst, citrine and crystal, globular carnelian beads etched with white dots, globular and biconical carnelian beads etched with bands of intersecting pentagons, faceted bicones of crystal, iron adzes, iron hoes and spades, and, appliquéd and plain glass bangle fragments.

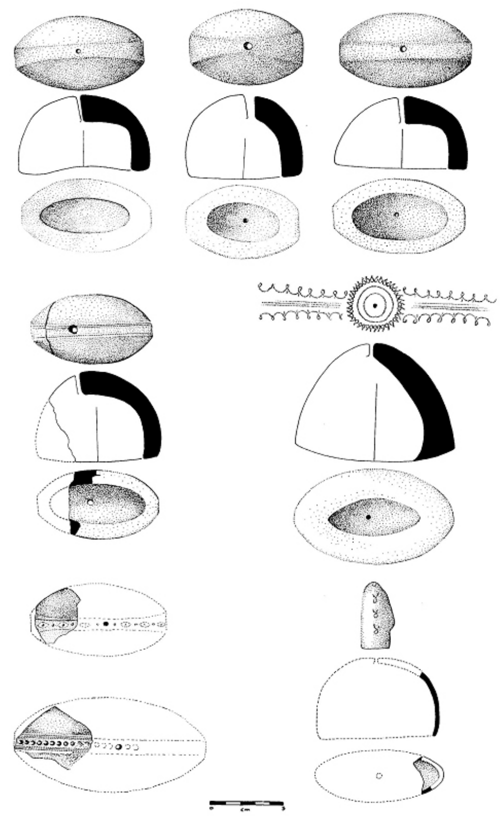


Fig. 4: Terracotta headscratchers from Layers 3 and 4 at Balathal

Conclusion

The presence of a large number of furnaces/furnace bases, tuyere fragments, and a small amount of slag definitely point towards the exploitation of iron on a scale beyond the requirements of a settlement of the size of Balathal[2]. The presence of largescale iron workings and huge heaps of slag at the site of Iswal not far from Balathal point to the availability

[2] In all a total of 6 furnaces were recovered from a single area measuring 15 X 10 m. There were, along with the bases, also the remains of the coiled sides of the furnaces. Two, in remarkably good condition also had visible flues. These 2 have been cut intact and taken for exhibition to the Rajasthan Vidyapeeth, Udaipur. Only a very small amount of slag and vitrified clay was recovered. All the furnaces were surrounded by a fine white 'ashy' layer (10 to 30 cm thick) which according to Prof. Gogte of Deccan College, had a well defined Illilite Peak, during XRD, suggesting burnt plant materials (i.e. fuel for the aforementioned furnaces). Thus we presume that the enormous quantity of ash plus the cluster of furnaces plus the absence of heavy slag were due to some secondary smelting activities.

of pre-smelted iron for purposes of secondary working in the vicinity[3]. The large number and variety of iron artefacts from the site further support this.

In the light of the various non-ferrous artefacts recovered from the site, the absence of their raw materials in the study area, and the absence of the facilities or debris of the processes of manufacture of these items, there is no other possible hypothesis to explain their presence but that of trade.

That this trade was on a large scale is obvious from the following points:

1. The site has yielded two sealings (fig. 5) bearing a device never seen before. It is that of a bullock-cart, a vehicle of paramount importance in the movement of goods during the Early Historic period.
2. The site is located at a place which has a permanent water source in an area well known for water scarcity.
3. The site produces items of two materials (iron and leather) critical to the army as well as the lay persons.
4. The site is located on the most plausible route from the north (Taxila or Mathura via Sambhar/Bairat/Rairh), through Rajasthan (Balathal to Nagari) and finally into Madhya Pradesh (via Avra and Mandsaur to Ujjain).



Fig. 5: Sealings; one with Bullock-cart and various Early Historical symbols and another is with Bullock-cart with Driver (in profile)

The above-mentioned facts, while not absolute in themselves, are further bolstered by the sheer variety of beads (in design, form and choice of raw material), terracotta female figurines, classic north Indian ceramics (B&RW, BSW, FGW and NBPW), and oddities like terracotta headscratchers, providing enough circumstantial evidence to offer a strong argument in favour of Balathal being an important trading station on an equally important trade route.

The above mentioned parallels in the artefactual assemblage of Balathal with those from a number of sites in Northern and Central India (Table 2) along with the C-14 dates (Table 1) from the site of Balathal clearly establish Period IIA (layers 3 & 4) at Balathal as pre-Mauryan/Mauryan (440 – 180 BC) and Period IIB (layers 1 & 2) as Kushan (50 – 150 AD). They also provide us with a tentative set of Artefactual Markers that will help us in assigning temporal parameters to Early Historic sites in Northern, Central and Western India where due to the relatively small size, lack of funds or lack of carbonised remains it is impossible to get C-14 dates.

Discussion on the need and directions for further research

Excavations at the site of Balathal have yielded a plethora of data pertaining to a period unknown hitherto in southern Rajasthan (Mewar). This period is also very sketchily understood in its own heartland. There is a crying need to excavate horizontally and vertically a number of sites in Rajasthan and in the rest of India so as to fully understand the phenomenon of Empire building in a period prior to that of the Mauryas and to understand the India that was known to Alexander and the Achaemenids.

There has been little or no work done on the Early Historic period in southern Rajasthan. Whatever little has been done has either been inadequate or remains unreported. The site of Nagari, for example, could yield a wealth of data pertaining to the periods under study. It is the hope of this author that a series of extensive and intensive excavations will be carried out in the study area so as to fill up the gaps in the early history of Rajasthan and add a new chapter to its glorious history.

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[3] The site of Iswal was dated comparatively to the earlier phase at Balathal by using ceramics recovered from within a newly cut section by me. These were analysed by Dr. Dandekar of Deccan College, who has studied the ceramics from Balathal for his Ph.D. and he found those from Iswal to be identical.

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Early Historic Ceramics of Mewar with Special Reference to Balathal, Udaipur, Rajasthan

Abhijit Dandekar

For archaeologists pottery has always been one of the most useful and significant markers of ancient food-producing cultures as it is found in the largest quantity at archaeological sites. Consequently, ceramic analysis occupies a significant place in archaeological study. The techniques employed by potters vary through time and space and this variation gives important clues for archaeologists in identifying ancient cultures, tracing their evolution, and for understanding socio-economic detail about migration, contact and trade of the pottery producing community. Pottery also provides important information about extra-mundane beliefs of its producers and users forming the foundation of protohistorical and historical studies.

Scholars have studied Harappan pottery in great detail. Chalcolithic pottery from various regions has also been studied in equal detail. Unfortunately, in case of the 'Iron Age' or Early Historic period, ceramic studies are restricted to a few specialised wares such as the Painted Grey Ware (PGW), Northern Black Polished Ware (NBPW), Black-and-Red Ware (BRW) and Red Polished Ware (RPW). Technologically less refined ceramics are mostly totally neglected or treated casually.

Research concerning the Early Historic period in India was also largely confined to the Ganga valley. Excavations outside this region were mostly aimed at confirming connections with this epicentre of second urbanization. Other scholarly research was dedicated understanding the nature and ramifications of Indo-Roman trade. Hence, emphasis was laid on markers of contact ranging from various types of antiquities to pottery. Local traditions of individual sites were neglected. As a consequence, the picture of Early Historic pottery remained inadequate.

The present paper is an attempt to understand the local traditions of pottery and its technology at the Early Historic site of Balathal in Mewar (Rajasthan) as also the relations these exhibit with other regions. It is an effort to throw light on the possible mobility of the local industry along with its established ceramic markers in order to place the Mewar region in general and Balathal in particular within the Early Historic context of the India.

Southeastern Rajasthan or 'Mewar' (23°49' & 25°28' N and 73°1' & 75°49' E) is an extension of the Malwa plateau. The region is bounded by the Aravallis on the west and by the outliers of the Aravallis on the east. The Gangetic plain lies on the northeastern side of this region.

Balathal Excavations

The archaeological site of Balathal (24°43' N and 73°59'E) (fig. 1) was jointly excavated by the Department of Archaeology, Deccan College, Pune and the Institute of Rajasthan Studies, Rajasthan Vidyapeeth, Udaipur under the supervision of Prof. V.N. Misra from 1994 to 2000.

The site yielded a two-fold cultural sequence comprising the Chalcolithic culture at the base capped by an Early Historic settlement with a break in between them.

The stratigraphy (fig. 2) of the Early Historic period is the same all over the mound. It is interesting to note that this period was confined mostly to the first three layers of the central part of the mound.

Layer (1) is light brown in colour. Its thickness varies from 15 cm to 25 cm and it is loose and homogenous in nature.

Layer (2) is dark greyish and more compact than layer (1). Its average thickness in all trenches varies from 40 cm to 45 cm and its maximum thickness is around 55 cm on the southern slope of the mound. The layer is disturbed over with various pits.

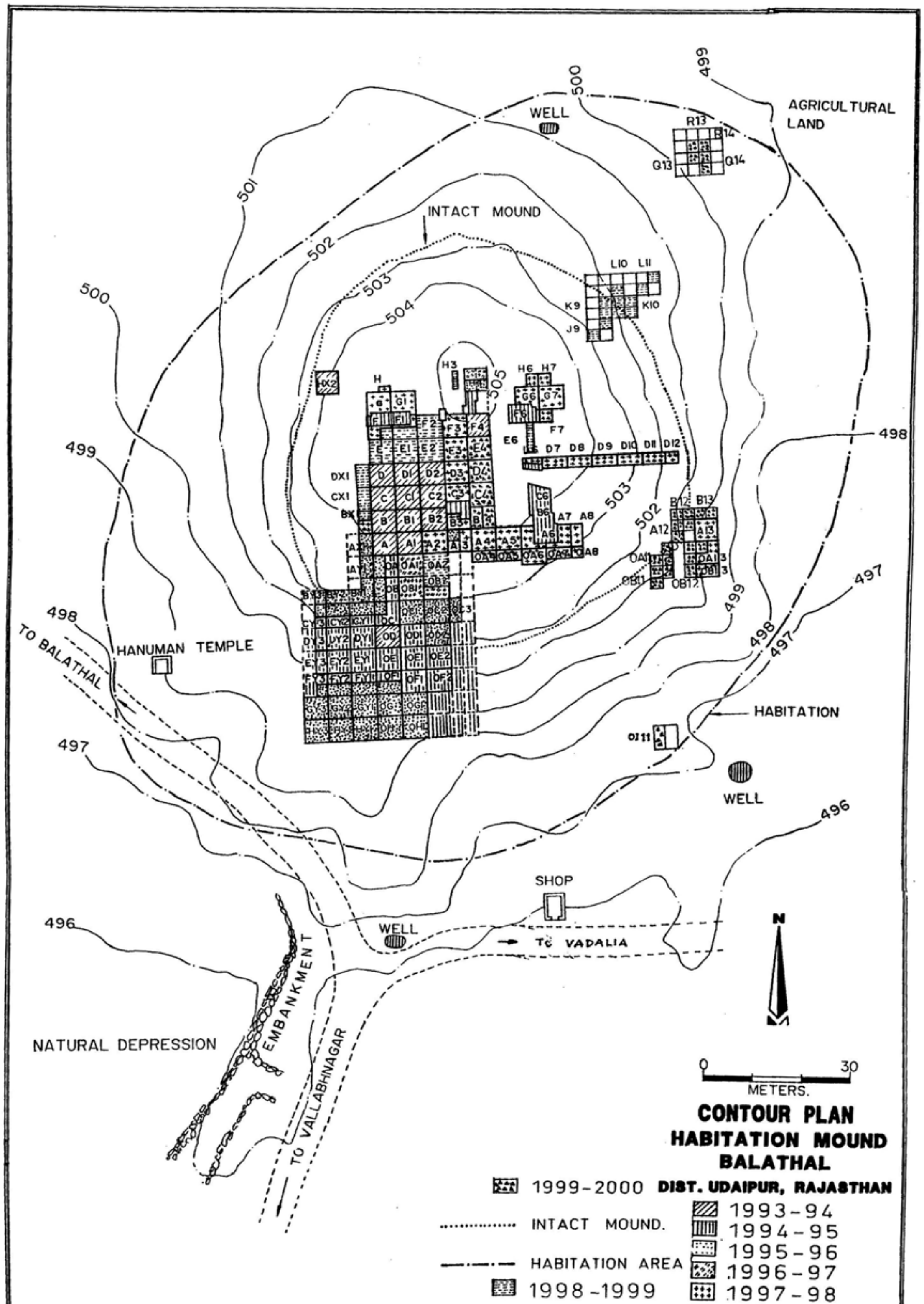


Fig.1 Ancient site of Balathal

Layer (3), the main Early Historic layer, is formed by the remains of large-scale iron-working activity at the site along with signs of the settlement having been completely burnt down consisting of ash, charcoal and reddish clods of burnt earth. Remnants of burnt wattle and daub structures, burnt floors and charred grains support this hypothesis. The layer is hard and porous, tapering towards the southern periphery of the mound. Its average thickness is 30 cm. The most important evidence from this layer is of iron working in the form of furnaces with iron slag and abundant objects (Misra *et al.* 1995: 75).

Layer (4) is completely white in colour. It runs almost horizontally all through the mound. Its thickness varies between 6 cm and 25 cm and it consists of ash, formed probably due to the burning of cowdung and other organic material at high temperature (Kshirsagar 1996: 113).

Layer (5) divides the Early Historic and Chalcolithic periods. It is a thick blackish layer. The upper part of the layer yields rolled potsherds of the Early Historic period, the middle part, rolled potsherds of the Early Historic and Chalcolithic periods and the lowest, rolled sherds of the Chalcolithic period.

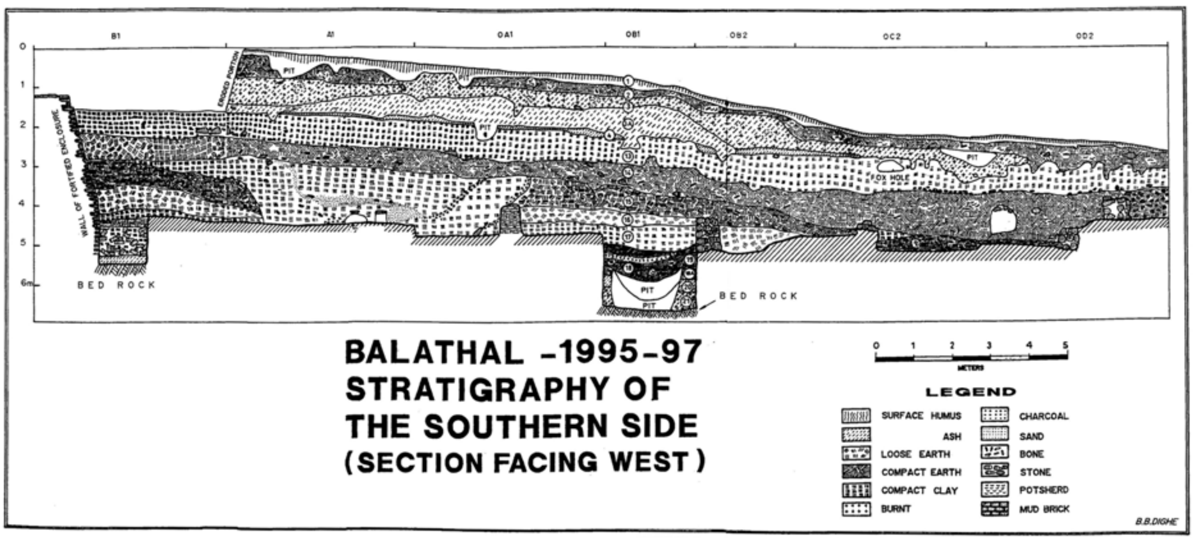


Fig.2 Early historic stratigraphy at Balathal

Study of the Early Historic ceramic industry at Balathal:

To make the study as comprehensive and scientific as possible, great care has been taken in the retrieval of primary data.

Various parameters such as colour, fabric, manufacturing techniques, surface treatment and decoration were used as a basis for the classification of pottery. A further categorisation was carried out on the basis of measurements taken at different points on the pot. A detailed classification of rim and base forms was also made.

Structural Classification:

Structurally, a vessel is divided into Rim, Neck, Shoulder, Body and Base consisting of four characteristic points, namely the End Point, Corner Point, Point of Vertical Tangency, and the Inflection Point (fig. 3).

The tip or lip of a vessel as well as its base is known as an ‘end point’. The point where the direction of the tangent changes abruptly or the point at which there is a sharp change in the contour of the pot is known as a ‘corner point’ (carination). The point where a tangent becomes vertical, as in the case of the maximum diameter of a spheroid, ovaloid or ellipsoid form, is known as the ‘point of vertical tangency’ and the point where the curvature of a vessel changes from convex to concave and vice-versa is known as an ‘inflection point’.

The entire ceramic assemblage has been classified into different vessel forms on the basis of morphological and functional criteria. The titles Jar, Jar/Pot, Globular Pot, Basin, Dish, Bowl, Lid, Lamp etc. are used as convenient and universally recognised labels for grouping and describing

pottery. At Balathal the category of pots has been further divided into 'globular pots' and 'pear-shaped Pots' as suggested by their shapes. Structurally, pottery can be classified only into Jar, Pot, Bowl and Dish, although functionally these four categories include many other sub-categories.

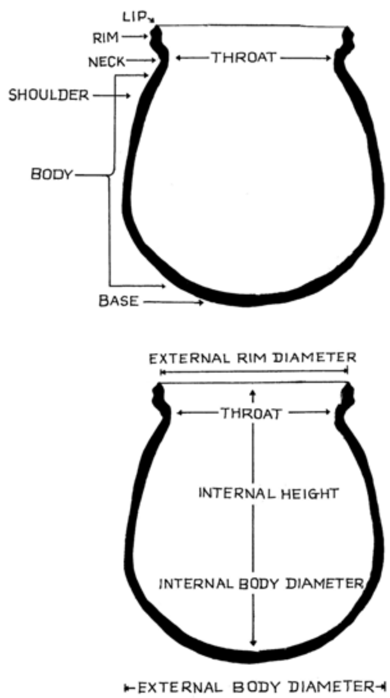
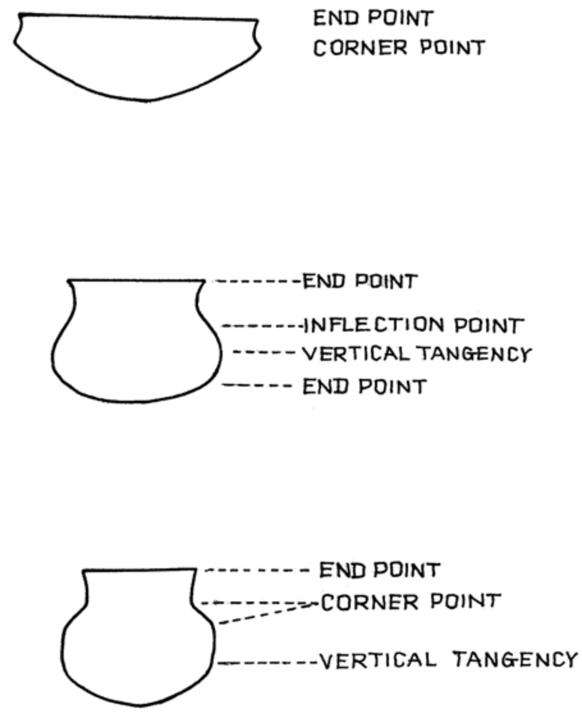


Fig.3 Different parts of a pot



The assemblage can also be classified into four categories on the basis of colour.

1. Red Ware
2. Grey Ware
3. Black-and-Red Ware
4. Black Ware

Red Ware

Pottery from this category is essentially red. However, shades differ between bright red to dull red depending on the surface treatment and conditions during firing. Information about the latter can be gleaned from the colour of the core, which is generally red in the case of bright red vessels and grey to black in the case of dull red vessels. The colour also depends on the presence or the absence of the slip.

Grey Ware

This pottery is generally grey but also includes some vessels, which have turned blackish due to the lack of controlled firing. A grey or black core is achieved by firing pottery in a reducing condition. Dishes, however, seem to have been fired in controlled condition as is evident from their white or whitish-grey core. All dishes are of a fine fabric (discussed later under 'Fabric') falling within a single category known as 'Fine Grey Ware'. The rest are either coarse or medium coarse and are classified as Coarse Grey Ware.

Black-and-Red Ware

Only a few dishes belong to this type. The rims of these dishes are black/grey on both their outer and inner sides whereas their bases are black/grey only on the outer side. The inner portion of the pot is red. No decoration is found on these dishes. Structurally, the dishes resemble those in the Fine Grey Ware.

Black Ware

Black Ware at Balathal consists of two types:

a) Black Slipped Ware (BSW) and
b) Northern Black Polished Ware (NBP).

Both of these occur essentially in the Ganga valley and "… One can rightfully call this ware (NBP) the

luxury porcelain of the Mauryas." (Hartel 1993: 358) Ample amount of work has been carried out on the subject of their provenance and technique (*IAR* 1960: 120-121; Hegde 1962; Sahay 1968; Sinha 1969; Sahi 1974; Roy 1981; Sinha 1997; Sharma 1997; Misra 1999). However, it may be noted that though the Black Slipped Ware is usually found in association with the Painted Grey Ware, it is strikingly similar to the Northern Black Polished Ware (Gogte 1989). It is therefore commonly thought that the Black Slipped Ware is an intermediate stage in the evolution of the Northern Black Polished Ware from the Painted Grey Ware (Gogte 1989).

Fabric

The entire ceramic assemblage can broadly be classified into the two categories of 1) Fine Ware and 2) Coarse Ware, depending upon the grain size of the clay and the nature of tempering material. The fabric is classified into a) Coarse or Coarse-Gritty, b) Medium Coarse, c) Medium, and d) Fine fabric.

The category of Fine Ware is further sub-categorised into Fine Grey Ware, Black-and-Red Ware, Black Slipped Ware and Northern Black Polished Ware. The category of Coarse Ware is sub-divided into the two varieties of Coarse Red Ware and Coarse Grey Ware.

Some types such as bowls and dishes falling within the categories of Coarse Red Ware and Coarse Grey Ware are relatively fine in fabric, but these have been grouped under the coarse category here for reasons of convenience since the selection of fabric or clay is not uniform. To put in other words, these were made of both fine and coarse fabric.

Thus the ceramic assemblage at Balathal can finally be classified into the following categories:

1. Coarse Red Ware
2. Coarse Grey Ware
3. Fine Grey Ware
4. Black-and-Red Ware
5. Black Slipped Ware
6. Northern Black Polished Ware

Manufacturing Techniques

On the basis of manufacturing techniques, pottery at Balathal can be classified into a) Wheel-thrown, b) Hand-made, and c) Partly wheel-thrown and partly hand-modelled. Most pots at Balathal belong predominantly to the first and the third varieties. Only some pots, including a bowl and toy pots of the Coarse Red Ware category, are completely hand made.

Surface Treatment

This involves the application of slip and polishing or burnishing of the pot. The slip is essentially a thick coat made of fine clay paste and some colouring agent (such as haematite). In certain cases, a very thin slip known as 'wash' is applied. A golden coloured wash is encountered on some pots at Balathal.

Ethnographic studies carried out in the region show this golden wash to be a paste made of white powder locally known as *Palevo*, which gives a golden colour after firing. Sediments produced by the igneous rocks of the area like granite and gneiss are rich in mica. Therefore mica particles are present both in the core and the slip of the pots. Their presence in the slip, especially in some Red Ware vessels gives them a lustrous appearance. Some pots are slipped as well as burnished while others are only slipped. On the other hand, some pots are burnished but not slipped and the rest are given no surface treatment at all.

Decoration

In stark contrast to the vessels of the Chalcolithic period, those of the Early Historic period at Balathal lack profuse decoration. However, the small range of decorations shows diversity. The patterns are mostly geometric in nature, along with simple lines and arches and can be classified, on the basis of technique, as follows:

1. Paintings: Painting is found only on Coarse Red Ware and is basically monochromatic in nature. The designs mainly comprise horizontal bands made in white colour with some decorations on it (fig. 4 Nos. D1, D2, D3, D4).

2. Applique Designs: Applique designs are found on Coarse Grey Ware and Coarse Red Ware. While designs on Coarse Red Ware are mostly confined to horizontal bands, either pinched or incised; they show a combination of incised and stamped decorations made on an applique band on the Coarse Grey Ware. Various geometrical as well as non-geometrical motifs and patterns are incised on pots (fig. 5, Nos. D5, D6, D7, D8).

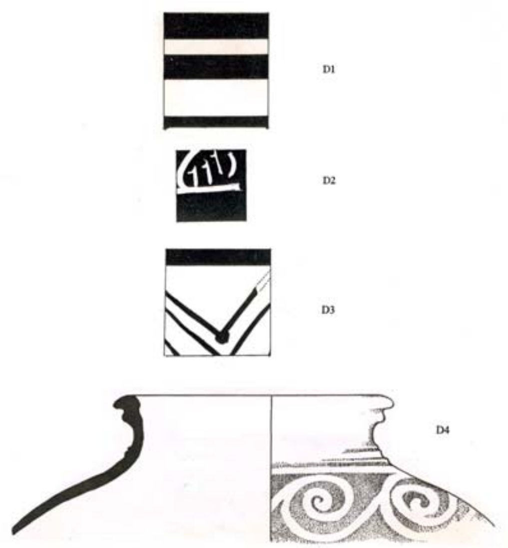


Fig.4 Painted designs

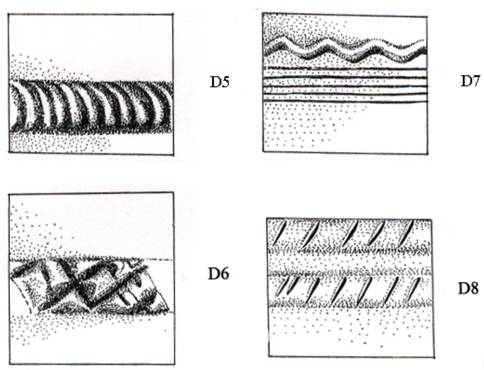


Fig.5 Applique designs

3. Incised Designs: Incised designs were probably made by a sharp instrument or a pointed stick. Various geometrical as well as non-geometrical motifs and patterns are incised on the pots (fig. 6 Nos. D9, D10).

4. Etching: Etched designs were probably executed by an instrument and not by any chemical process. The term etching here connotes the carving or scooping out of a particular decorative pattern on a surface (engraving). The instrument used must have been denticulate in nature with sharp triangular points, as most decorative patterns of this type are essentially triangular (fig. 7 No. D11).

5. Punctures: Punctured designs are made by pricking the wet surface of the pot with a pointed instrument, probably executed while the pot was still rotating on the wheel. Due to this, the puncture marks resemble incised triangles (fig. 8 Nos. D12, D13).

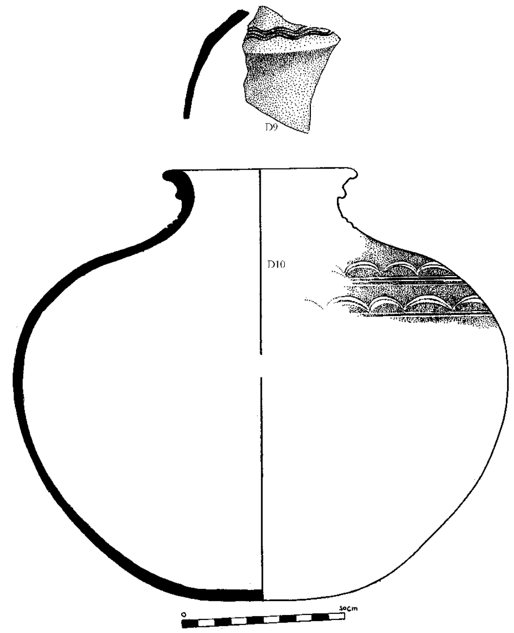


Fig.6 Incised designs

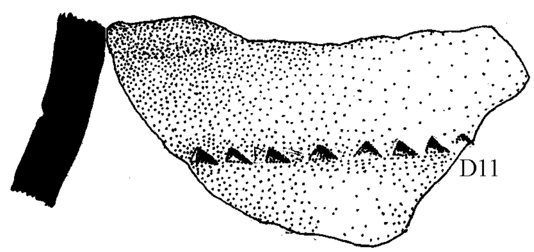


Fig.7 Etched design

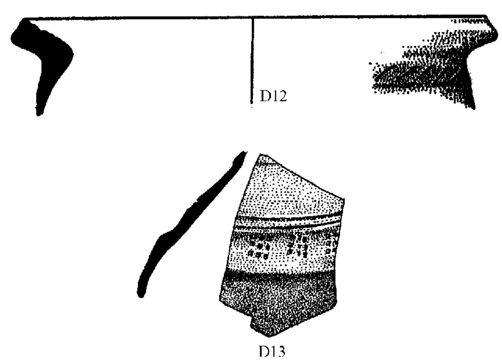


Fig.8 Punctured designs

6. Stamped Decorations: Stamped decorations vary from concentric circles to floral patterns to ‘swastika’ motifs. Designs are also made out of mat impressions (fig. 9 Nos. D14, D15, D16).

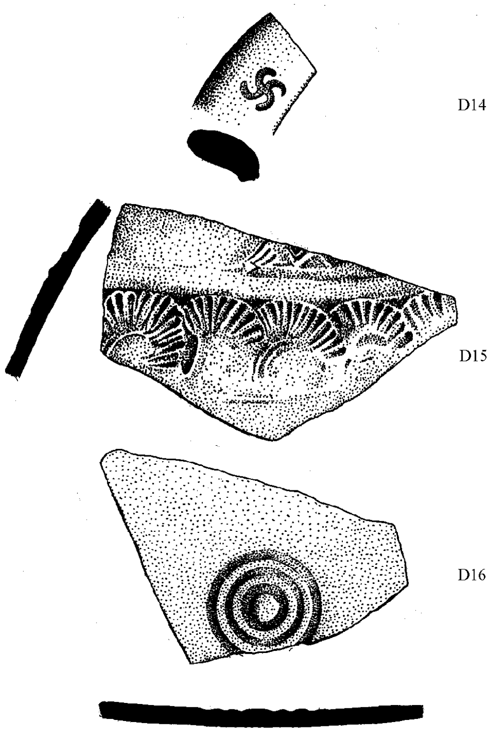


Fig.9 Stamped designs

7. Etched design (D11)

8. Graffiti: Graffiti comprising ‘swastika’ motif and straight intersecting lines found only on Fine Grey Ware sherds (fig. 10 Nos. D17, D18).

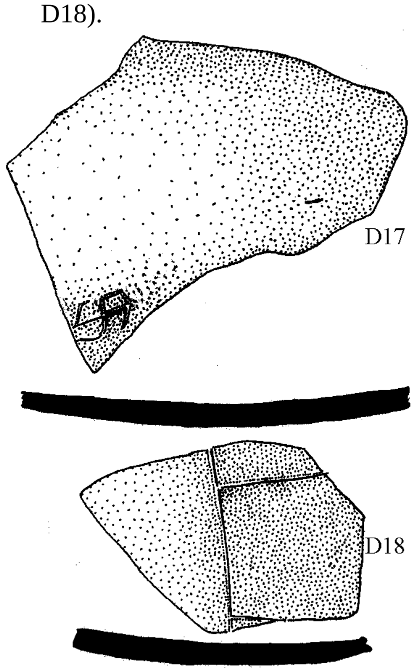


Fig.10 Graffiti

9. Pinched Design: Pinched designs are executed by pinching the applique band or the body/rim of the pot at definite intervals (fig. 11 Nos.D19).

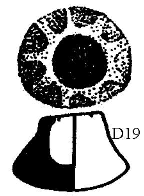


Fig. 11 Pinched design

10. A combination of two or more of the above techniques: Patterns formed by a combination of the above mentioned decorations also form a category in itself (fig. 12 Nos. D20, D21, D22, D23).

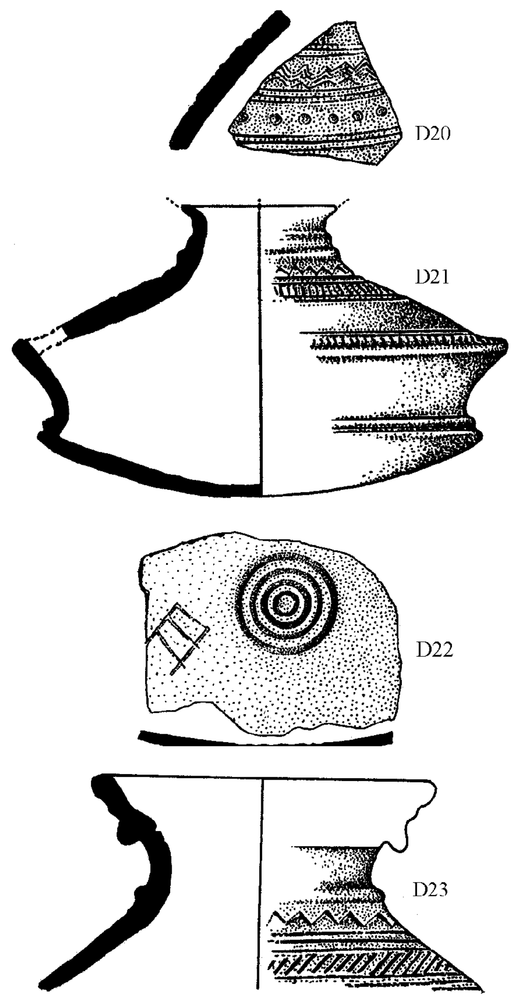


Fig.12 Combination of different design techniques

Morphological classification of the ceramic assemblage at Balathal is as follows:

Coarse Red Ware:

Storage Jars (fig. 13 Nos. 1, 2, 3)

The fabric varies from coarse to medium-coarse in storage jars at Balathal. Some types display an application of slip as well as the evidence of burnishing, while others are slipped though not burnished. Many a time, applique decorations are encountered on the shoulder of the pot.

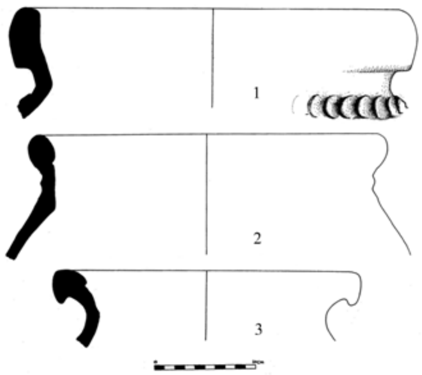


Fig.13 Coarse Red Ware: Storage Jars

Jar/Pots (fig. 14 Nos. 4, 5, 6, 7, 8, and 9)

This category at Balathal includes vessels, which have wide mouths and globular bodies. Its fabric is medium–coarse. The vessels are slipped but generally not burnished although one of the types shows evidence of burnishing.

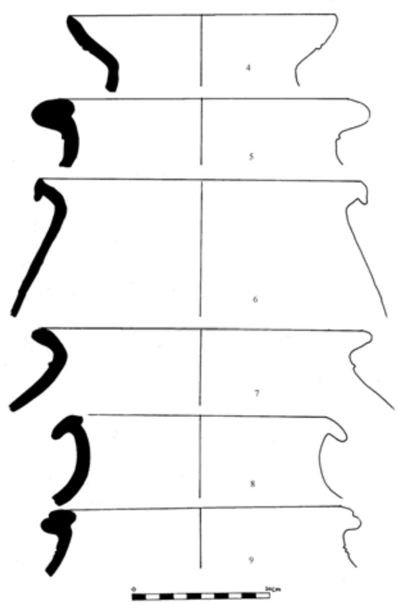


Fig.14 Coarse Red Ware Jar/Pots

Globular Pots

This category at Balathal consists of vessels with a globular body and a narrow mouth. There are four sub-categories in this:

1. Pots with wide mouths where the diameter of the orifice is between 15 and 28 cm (fig. 15 Nos. 10, 11, 12).

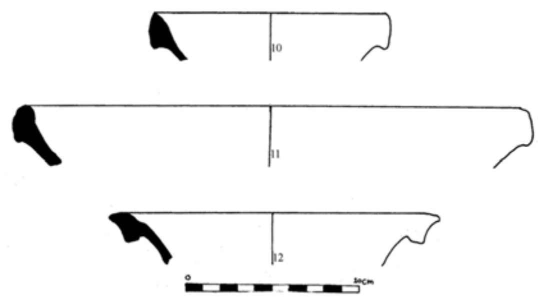


Fig.15 Coarse Red Ware: Globular Pots: Sub Category 1

2. Pots with narrow mouth and constricted neck where the diameter of the orifice varies between 10 and 19 cm (fig. 16 Nos. 13, 14, 15).

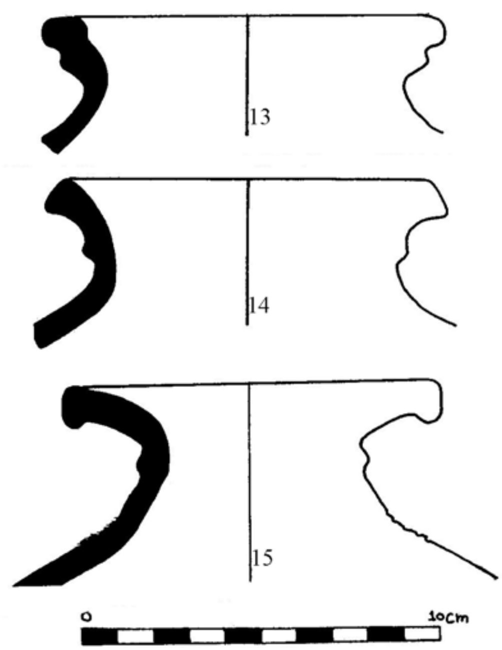


Fig.16 Coarse Red Ware: Globular Pots: Sub Category 2

3. Pots with elaborate necks where the diameter of the orifice varies between 7 and 17 cm (fig. 17 Nos. 16, 17).

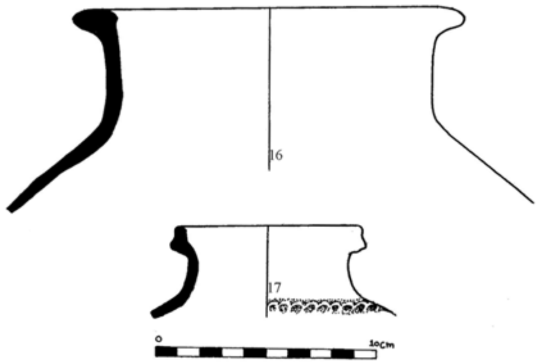


Fig.17 Coarse Red Ware: Globular Pots: Sub Category 3

4. Pots without necks, in which case the neck is virtually absent and the body starts directly from below the rim. The diameter of the orifice varies between 15 and 18 cm (fig.18 Nos. 18, 19).

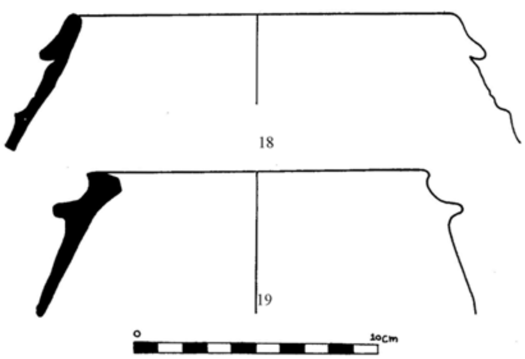


Fig.18 Coarse Red Ware: Globular Pots: Sub Category 4

Pear-Shaped Pots

Pear-shaped pots are generally grouped under the morphological category of globular pots. They have been included in a different category because all pots showed a very typical shape with sloping sides broadening significantly towards the base giving the pot a pear-like shape. The base is invariably contiguous rounded and the maximum body diameter is seen to appear near the base unlike other globular pots where the maximum body diameter comes somewhere near the shoulder. Also, the fabric of all the pots is coarse and gritty and they appear to be highly utilitarian in nature. These pots are fired in uncontrolled conditions and are devoid of any surface treatment or of any kind of decoration.

It is also interesting to note that the rim forms in this category do not show much variation apart from the lip portion (smaller/ broader/ thicker/ rounded etc.) which put them into various categories. Almost all the rims have a ridge at their base. The rims have been termed as broad or narrow depending upon the distance between the uppermost point of the lip and this ridge.

There are two sub-categories formed within pear-shaped pots, which are due to the difference of angle between the sloping sides and horizontal tangent at the neck. Pots with an angle less than 70° (fig. 19 No.20) are put into one category and pots with an angle more than 70° (fig. 19 Nos. 21, 22) are put into another. In other words, the pots falling into the first category are more globular and have a greater storing capacity than those in the second category. Functionally therefore, pots belonging to these two sub-categories could have served different purposes.

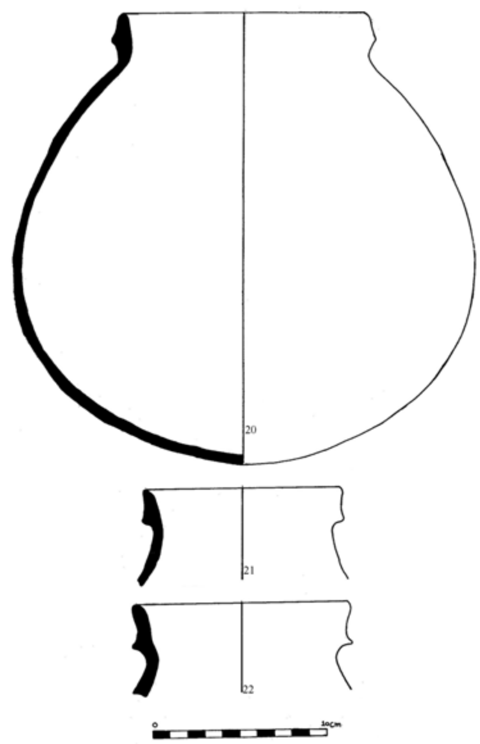


Fig.19 Coarse Red Ware: Pear Shaped Pots

Carinated Pots

Pots belonging to this category have a prominent or sharp carination on or just below the shoulder. This category can be divided into three sub-categories on the basis of its morphological features.

Sub-category 1 (Fig. 20 Nos. 23, 24) deals with pots having an externally projecting square rim, a corrugated shoulder and a basal portion which is

either rusticated or bears soot marks. Parallel grooves are often observed on the upper side of the rim. The pots invariably have a thin mica wash on them from the rim to the carination. This portion also often has incised designs. The designs, mainly puncture marks or oblique incised lines, are made just below the neck. The neck itself is generally very constricted.

Sub-category 2 (fig. 20 Nos. 25, 26) includes pots with inverted tapering rims. In other words, these rims are absolutely featureless. These pots are either slipped and burnished or devoid of any surface treatment.

Sub-category 3 (fig. 20 Nos. 27, 28) deals with pots with a double carination. The first carination is at the shoulder and the second near the base. The body is either concave or flat between these two carinations. All carinated pots are essentially made of medium-coarse fabric.

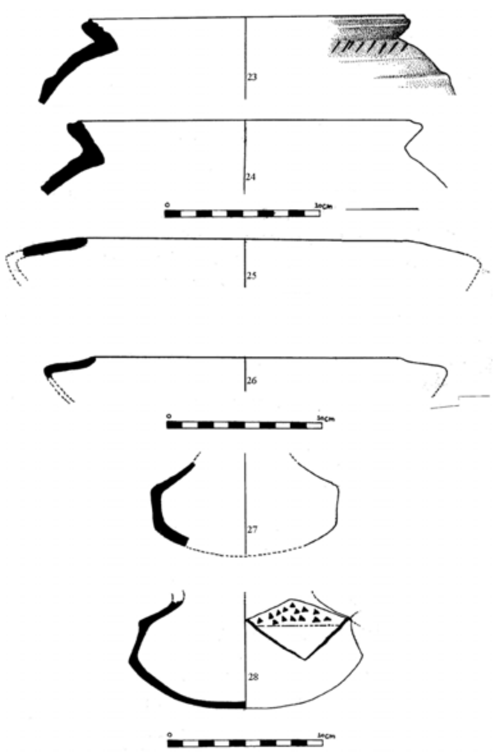


Fig.20 Coarse Red Ware: Carinated Pots

Dishes (fig. 21 Nos. 29, 30, 31)
Dishes in Coarse Red Ware are very few in number. There is also not much variation in the shape. This is obvious from the fact that the morphological variation is primarily restricted by its functional attributes.

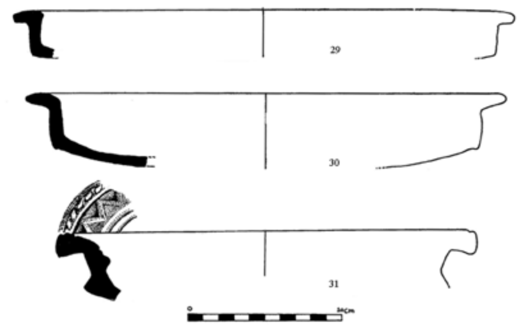


Fig.21 Coarse Red Ware: Dishes

Basins (fig. 22 Nos. 32, 33, 34)
Basins found at Balathal show a variety of rim forms. While some of them have bodies that follow a smooth curvature, others demonstrate a carination in the beginning. The rims vary from inverted to everted to externally projecting and to even bilaterally projecting forms. The fabric varies from coarse to medium-coarse. Even the surface treatment varies from no surface treatment to mica wash to elaborate slip and burnishing.

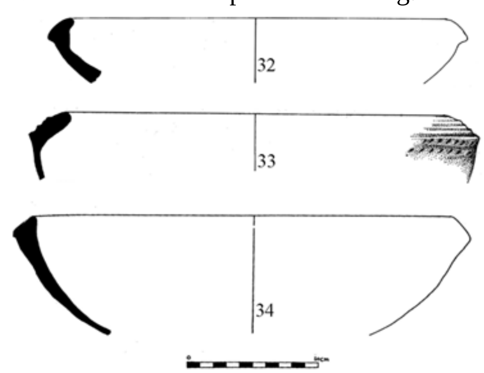


Fig.22 Coarse Red Ware: Basins

Bowls and Cups (fig. 23)
Bowls found at Balathal are mostly of a ‘V’-shape (Nos. 35, 36, 37). Apart from a small category of small convex sided bowls categorised as ‘cups’ (Nos. 38, 39), almost all of them have sloping bodies.

Lids (fig. 24)
Lids can be classified into four sub-categories on the basis of whether they have a simple or well-developed knob and the mode of its usage. These sub-categories include:

1. Lids with simple knobs (Nos. 40, 41): These lids show a lot of variation ranging from sloping and flaring bodies to globular and bell shaped bodies.

2. Lids with well-developed knobs (Nos. 42, 43): Lids in this category have bell-shaped bodies and a thin mica wash. There is very little variation in the shape of the knobs. These lids are made of medium to medium-coarse fabrics.
3. Lids with internal projecting rims or Lid-cum-bowl (No. 44): This variety is grouped under lids and not under bowls for two reasons. Firstly, the rims are irregular or distorted and secondly the outer side of the vessel is smooth and the inner side is rough.
4. Lids shaped like a stopper with a projecting ledge (No. 45):

All these are either made out of fine or medium fabric. Some of them show evidence of surface treatment such as mica wash.

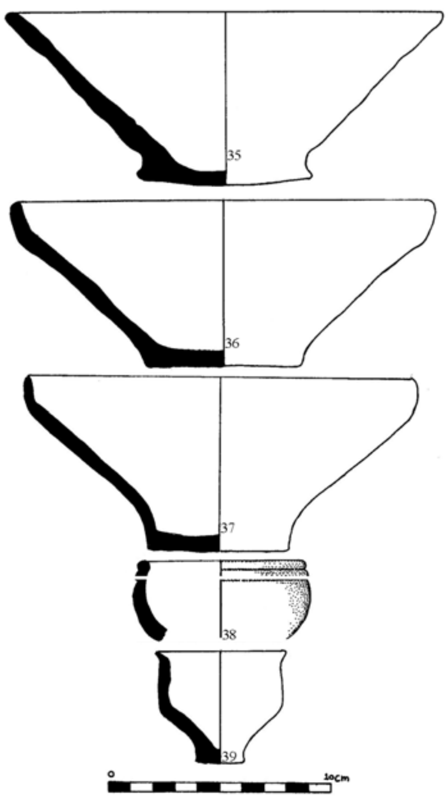


Fig.23 Coarse Red Ware: Bowls and Cups

Stands (fig. 25)
Stands in Coarse Red Ware at Balathal are of two types. The first comprises of ring-stands (No. 46) and the second of bi-conical stands (No. 47). While only one type is found within the first category, the second is comprised of a number of types on the basis of variations found in rim forms. All the stands are made of medium-coarse fabric and are devoid of any surface treatment.

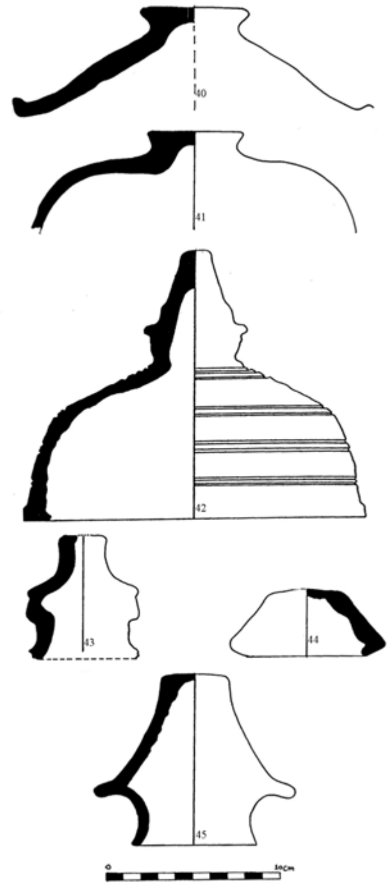


Fig.24 Coarse Red Ware: Lids

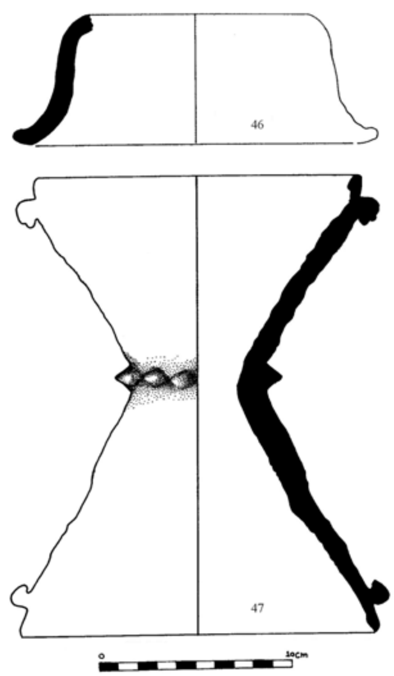


Fig.25 Coarse Red Ware: Stands

Lamps (fig. 26)
This is a functional category morphologically described as small and shallow bowls. They show four types of variations. The first variation is the composite lamp. This is an example of small lamps, which are fixed or luted to the rim of a bowl to form one composite lamp (No. 48). This category is generally described as votive tanks

The second variation can also be described as small and shallow with an everted squared rim and a non-contiguous flat discoid base (No. 49). This variety is the largest in number and some lamps have a deliberate circular perforation on their bases. In one instance, there is also a triangular perforation. However, the functional purpose of these perforations is difficult to determine.
The third variation can be seen in the lamp with a vertical tapering rim and a convex body (No. 50).

The fourth variation of the lamp has special features such as channel spouts (No. 51).

All lamps are made from medium to fine fabric and are devoid of any surface treatment. Some of them show soot marks on their rims.

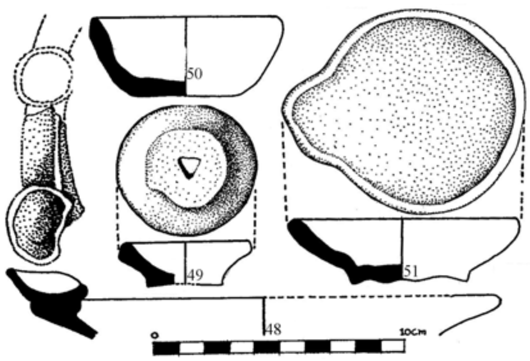


Fig.26 Coarse Red Ware: Lamps

Small Pots (fig. 27, Nos. 52, 53) **and Toy Pots**
This category encompasses pots, which are smaller replicas of regular vessels. A careful distinction has been made between the categories of small pots and toy pots on the basis of their mode of manufacture. Small pots are wheel-thrown whereas toy pots are handmade. All the pots are made of medium to medium-coarse fabrics. Barring one example in the category of small pots, none of them show any evidence of surface treatment.

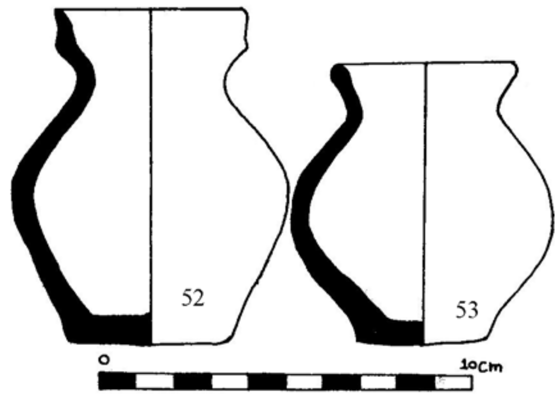


Fig.27 Coarse Red Ware: Small Pots

Toy Pots (Fig. 28 Nos. 54, 55, 56, 57)
Toy pots show a lot of variation within their morphology although they do not number much in quantity. They range from straight-sided bowls to globular pots to lamps. Due to being handmade, they are often quite distorted. Barring two examples, they do not show evidence of any surface treatment or decoration. All of them are made of either fine or medium fabric.

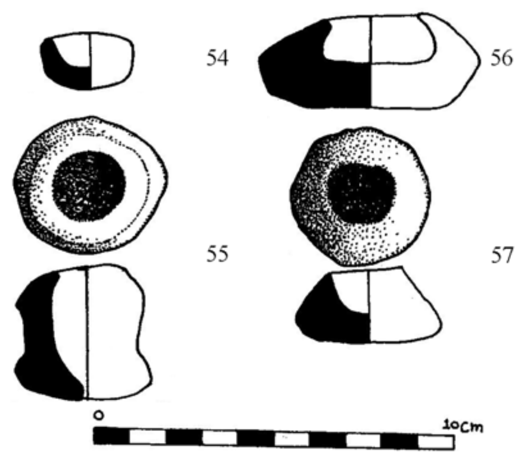


Fig.28 Coarse Red Ware: Toy Pots

Spouts and Handles: (Fig. 29 Nos. 58, 59, 60, 61)
These are accessories of a pot. Spouts show a variety of forms, some of which also have decorations. The shapes vary from tubular to channeled in nature. Handles on the other hand show no variety and have slightly flattened rounded bodies. Both spouts as well as handles are found luted to the pot.

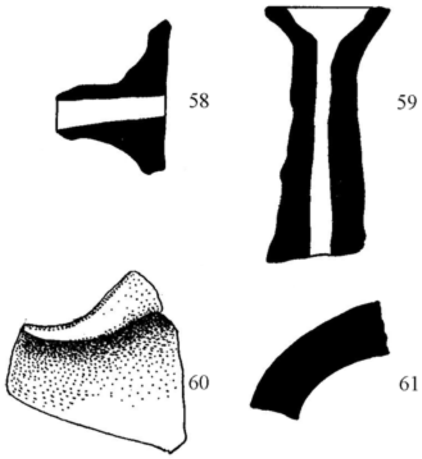


Fig.29 Coarse Red Ware: Spots and Handles

Coarse Grey Ware

Compared to Coarse Red Ware, Coarse Grey Ware measures less in quantity. However, it shows a great deal of morphological variation and is also more decorative compared to the former. This ware shows abundant forms of incised, applique, stamped, punctured and other kinds of decorations. The designs are invariably a combination of different techniques. Although not always slipped, many pots are found to be burnished. Almost all the different forms present in the Coarse Red Ware are present in this ware.

Jars (Fig. 30 No. 62)

Only one Jar from the Coarse Grey Ware was found at Balathal.



Fig.30 Coarse Grey Ware: Jar

Jar/Pots (Fig. 31 Nos. 63, 64)

This category includes pots with wide mouths and globular bodies, which are with or without carination. Pots without carination have internally projecting rims whereas pots with carination have externally projecting rims. All the pots exhibit some decoration on their bodies.

Globular Pots (Fig. 32)

This category has two varieties. The first variety is that of globular pots with external projecting rims (Nos. 65, 66, 67) and the second is that of globular pots with internal projecting rims (No. 68). Pots belonging to the first category are mostly plain and devoid of any decoration. Pots in the second category display intricate decorative patterns.

There is another category among globular pots, which exhibit an extremely globular or almost spherical body. These are slightly stunted and have a squat shape. The base is contiguous rounded (No. 69).

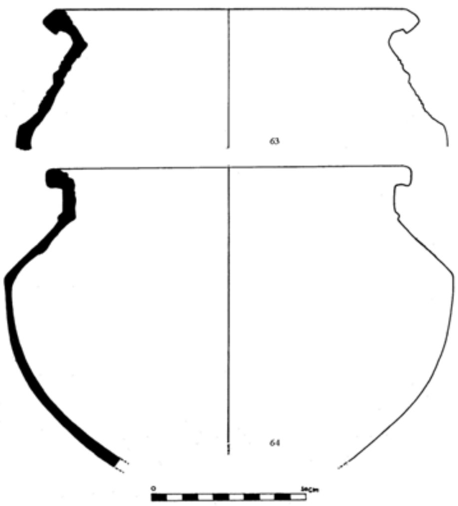


Fig.31 Coarse Grey Ware: Jar/Pots

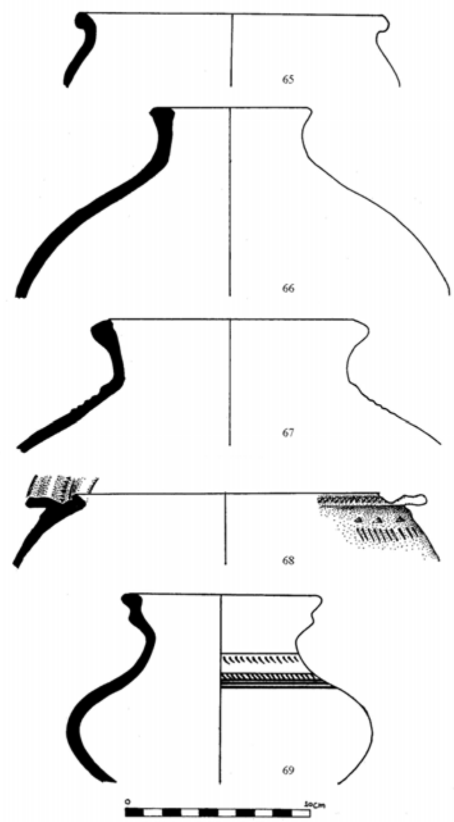


Fig.32 Coarse Grey Ware: Globular Pots

Carinated Pots (fig. 33 No. 70)
These are medium sized pots with a carination. While one variety of this can functionally be described as cooking pots the other variety can functionally be described as bottles (No. 71).

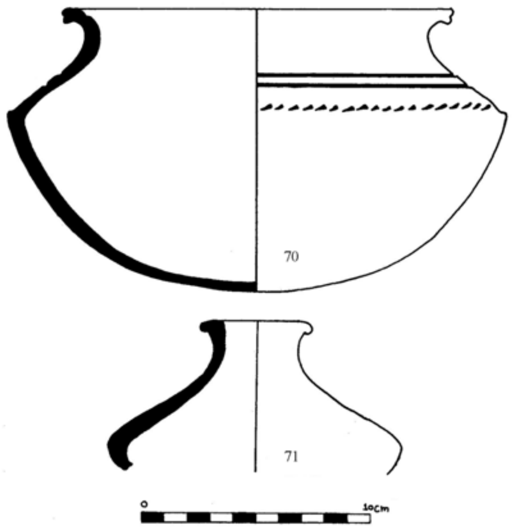


Fig.33 Coarse Grey Ware: Carinated Pots

Pots with Double Carination (fig. 34 Nos. 72, 73)
This is an interesting category since not only do the pots have a double carination, but they also have a channel spout luted onto them. The entire body till the upper carination is intricately decorated with a combination of various patterns. While some pots are slipped and burnished others show no evidence of any surface treatment at all. It is the only type of pot with very little variation.

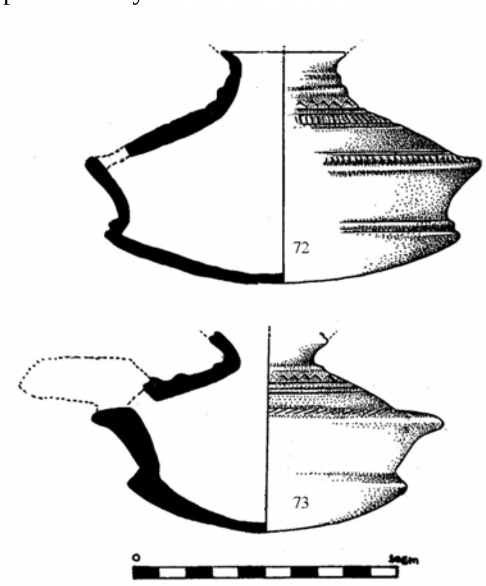


Fig.34 Coarse Grey Ware: Pots with Double Carination

Dishes (fig. 35 No. 74)
Not many dishes were found in the Coarse Grey Ware category at Balathal. However, the few examples found resemble dough plates.

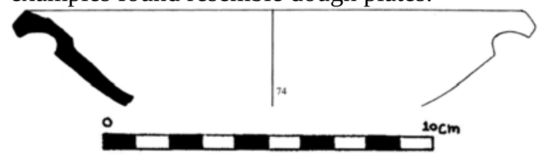


Fig.35 Coarse Grey Ware: Dishes

Basins (fig. 36 Nos. 75, 76, 77)
Basins in Coarse Grey Ware are plain and devoid of any surface treatment. One of the types has a ledge attached to the body.

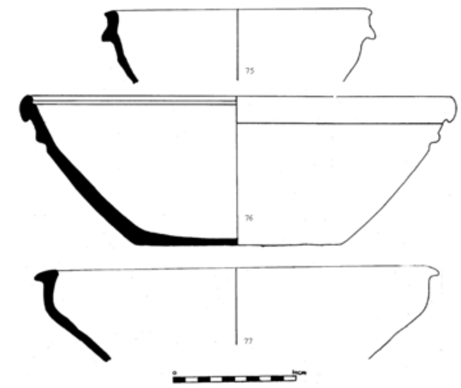


Fig.36 Coarse Grey Ware: Basins

Bowls (fig. 37 No. 78)
There is only one variety in this category which can be more appropriately described as cups. It has an almost vertical slightly convex body.

Lids (fig. 37 No. 79)
Lids in Coarse Grey Ware do not show much variation. They have well-developed knobs which show a slight variation. The body is generally slightly globular. Some examples show evidence of surface treatment while the others are devoid of it.

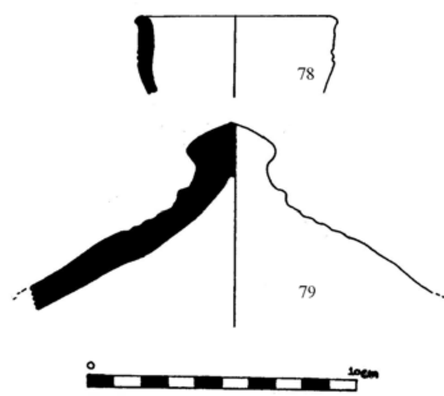


Fig.37 Coarse Grey Ware: Bowl & Lid

Fine Grey Ware
This ware shows a great deal of morphological similarity with the Painted Grey Ware. There are two types of pots found in this ware, which include 1) Dishes and 2) Carinated pots with inverted rounded rims.

While many pots are slipped and burnished, some of them are devoid of any surface treatment. The dishes have stamped concentric circles on their bases just at the centre. Some of these bases have graffiti marks on them as well. These vary from simple intersecting lines to the 'swastika' motif.

4.3.1 Dishes (fig. 38 Nos. 80, 81, 82)
Though restricted by their functional attribute, the dishes show a lot of variation in form especially in their rims, which range from short to tall. The distinction between the short, medium and tall rim is made on the basis of its external length, measured from the point from where the base ends.

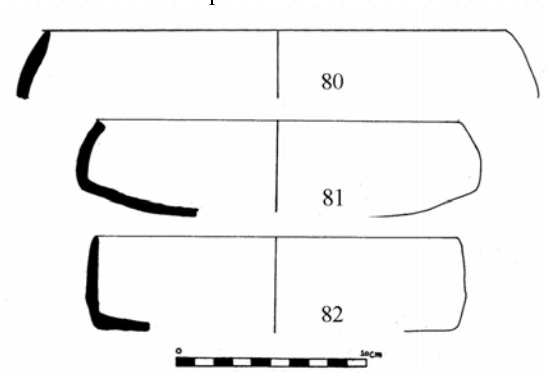


Fig.38 Fine Grey Ware: Dishes

Carinated Pots (fig. 39, Nos. 83, 84)
This category is very similar to the second sub-category (Nos. 25, 26) of the carinated pots in the Coarse Red Ware. They show inverted rounded rims.

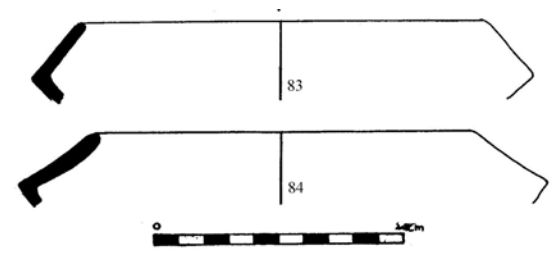


Fig.39 Fine Grey Ware: Carinated Pots

Black-and-Red Ware (fig. 40 No. 85)
Only one morphological variety of vessels (dish) is found in this category. It is slipped from both the sides. Both sides of the rim and the outer side of the base are black while the inner side of the base is red or brown.



Fig.40 Black & Red Ware: Dish

Black Slipped Ware (fig. 41 Nos. 86, 87)
This ware is generally associated with the Northern Black Polished Ware (NBPW) in the Ganga valley. However, this ware comprises only dishes at the site of Balathal.

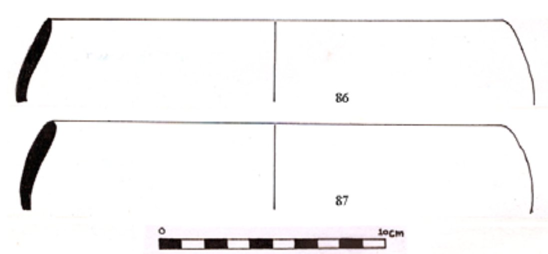


Fig.41 Black-Slipped Ware: Dishes

C-14 Dates from Balathal
Altogether 14 C-14 dates are available from the Early Historic levels at Balathal. These are in order of layers:

S. No.	Lab. No.	**Tr.**	**Lyr.**	Depth (m)	Half-life 5730	Calibrated Dates (Calib 1)	Summary (BC)
1	BS-1800	C4	1	0.31	3120+/-120		1518 (1407) 1220 BC.
2	PRL-1848	C	2	0.5	1820+/-70	AD 229, 256, 296, 319, 382	
3	PRL-1850	C1	2	0.47	3530+/-70	BC 1850, 1734, 1721, 1699, 1634	
4	BS-1567	OA2	3	1.38	1900+/-90		19 (100) 224 AD
5	BS-1885	CX1	3	1.03	2030+/-120		197, 40, 24, 7, 2 BC, AD 115
6	PRL-1841	HX2	3	0.84	2110+/-60	BC 114, 40, AD 20	

7	BS-1879	B1	3	0.84	2200+/-70		381, 349, 318, 228, 221, 207, 169 BC.
8	PRL-2043	A3	3	1.05	2230+/-90	BC 367, 185, 43	
9	BS-1566	A	3	1.44	2280+/-90	379 BC	405 (379) 208 BC.
10	PRL-1849	C	3	0.9	2290+/-70	BC 394, 372, 204	
11	BS-1881	A1	3	1.04	2520+/-70		796, 763, 676, 674, 520 BC.
12	BS-1781	C4	3	0.75	7180+/-180		6224 (6023) 5842 BC
13	PRL-1983	A	4	1.77	2350+/-80	BC 399, 377, 202	
14	PRL-1851	B4	4	1.4	3510+/-70	BC 1746, 1683, 1618	

Northern Black Polished Ware

No morphologically diagnostic sherds of this ware have been found from the site. Hence its details cannot be given. However, it might be noted here that all the sherds recovered posses a golden lustre on their surface.

It is obvious that the two dates from Tr. C4, one date from Tr. C1 and one from Tr. B4 are in no way ascribable to the Early Historic and are in fact Chalcolithic dates and must mean contaminated sample. These dates have thus not been taken into consideration whilst ascribing chronological limits to the Early Historic at Balathal.

It is clear from the above table that layer (3) is datable to between 400 BC and 160 BC uncalibrated, and therefore roughly between 440 and 180 BC calibrated. Layer (2) is thus dated to 130 AD to 50 AD uncalibrated, probably pushing it back to about 100 BC to 100 A.D after calibration.

Comparative Study

Most of the ceramic assemblage of Early Historic Balathal is utilitarian in nature and its morphology remains the same throughout the occupation of the site e.g. a globular pot with an externally projecting rim or a 'V'-shaped bowl which are being manufactured to this day. In other words their morphological characteristics are nearly static through time. Hence, although lower dates for their existence can be ascertained, the upper limit can't be fixed and this gives no clues about chronology.

However, some of the types in the utilitarian category demonstrate interesting patterns of their existence, survival and distribution. Such types are selected and examined for their distribution pattern through time and space. This was done in order to understand the contacts and chronology of the site. These types are as follows.

1. Pear-Shaped Pot (Fig. 19 Nos. 20, 21, 22)

This type was probably considered unimportant due to its very crude form, with virtually no surface treatment or decoration. However its spread shows that it was manufactured along with the NBP and co-existed with it. It disappears almost simultaneously with the NBP.

In the pre-Mauryan times, i.e. c. 600-300 BC, it was found at Atranjikhera in period IVC (Gaur 1983: Fig. 5 p. 13); Hastinapura period III (Lal 1956: Figs. 18.XXIa, b, g pp. 59-60); Kausambi period IIb/III (Sharma 1960: Fig. 11.87, p. 66); Rajghat period Ib/Ic (Narain and Roy 1977: Fig. 11.19, pp. 41-42); Rupar period III (Sharma 1953: Figs. 4, 5.16, 5.19, p. 125); Tripuri period II (Dikshit 1955: Figs. 20.93A, B, C pp. 59-60, Figs. 21.100, 100a, pp. 61, 63) and Bagor (Misra 1971: Fig. 25.1, p. 103-4).

In the Mauryan period i.e. *c*. 300-150 BC, its provenance increases and it has been found at almost all the other belts in the Ganga valley and outside. These sites include Ahar period IIa (Sankalia *et al.* 1969: Figs. 85.T235, 235a, p. 151); Ahichchhatra period II (Ghosh and Panigrahi 1946: Figs. 1.10a, b, pp. 42-43); Atranjikhera period IVD (Gaur 1983: Fig. 5, p. 13); Avra period III (Trivedi 1963: 30); Bhita period II (Marshall 1910: Pl. XXIX. 43, pp. 43. 82); Hastinapura period III (Lal 1956: Figs. 18.XXIa, b, g, pp. 59-60); Kakrehta period V (Sharma and Mishra 1992: Fig. 18.2, pp. 77-78); Kumrahar period I (Altekar and Mishra 1959: Figs. 24.1, 5, 37, pp. 64-65); Nagda period III (Banerjee 1986: Figs. 38.53, 53 a, b, c, pp. 154-155); Nasik period IIa (Sankalia and Deo 1955: Fig. 7.T.Ic, Pls. XI.2, 3, p. 52); Prakash period II (Thapar 1967: Figs. 26.40, 40a, p. 83); Sonkh period II (Hartel 1993: 358.84); Sonpur period II (Sinha and Verma 1977: Fig. 31.16 pp. 69-70); Taxila period II/III (Marshall 1951: Pl. 122.32 p. 410); Timbarva (Mehta 1955: Figs. 8.48, 49, p.13); Tilaura-kot period I (Mitra 1972: Figs. 16.CXXV,

CXXVa, b, c, e, f, g, h, i, j, k, p. 61); Tripuri period III (Dikshit 1955: Fig. 29.162, pp. 73-74); Vaisali period IB (Deva and Mishra 1961: Figs. 17.57, 58, pp. 38, 42); and Vaisali period II (Sinha and Roy 1969: Fig. 27.18, pp. 58, 59). Almost all the varieties of pear-shaped pots that are present at Balathal are also found at Tilaura-kot.

During the period immediately after the Mauryans, i.e. c. 150-100 BC, pear-shaped pots decline at most sites. They are found only at a few sites such as Ahichchhatra period II/III (Ghosh and Panigrahi 1946: Figs. 1.10a, b, pp. 42-43); Atranjikhera period IVD (Gaur 1983: Fig. 5, p. 13); Kakrehta period V (Sharma and Mishra 1992: Fig. 19.2, pp. 78, 80); Kumrahar period II (Altekar and Mishra 1959: Fig. 24. 33, pp. 66-67); Nasik period IIB (Sankalia and Deo 1955: Fig. 7.T.Ic, Pls. XI.2, 3, p. 52); Tripuri period IIIA (Dikshit 1955: Fig. 29.162, pp. 73, 74) and Vaisali period III (Sinha and Roy 1969: Fig. 40.25, pp. 87, 88).

From *c*. 100 BC to 50 AD, pear-shaped pots almost cease to exist apart from a couple of sites such as Nasik period IIB (Sankalia and Deo 1955: Fig. 7.T.Ic, Pls. XI.2, 3, p. 52); Timbarva (Mehta 1955: Figs. 9.76, 77, p. 15) and Sonpur period III (Sinha and Verma 1977: Figs. 32.13, 15, pp. 71, 74).

Apart from some stray finds in the early centuries of the Christian era at Bhita period IV (Gupta period) (Marshall 1910: Pl. XXX.94, p. 85) and at some un-stratified contexts at Nagari this type declines.

On the basis of the above-mentioned evidence, the date for the occurrence of pear-shaped pots can roughly be estimated between *c*. 400-150 BC.

2. Carinated Pot with an Inverted Tapering Rim (Fig. 20 Nos. 25, 26) (Fig. 39 Nos. 83, 84)

This shape has its origins in the PGW. It has been considered as a cooking pot although it continues to occur in the NBP. In the later case, it could have served as tableware as well. The shapes have also been copied in the Coarse Red Ware and the Coarse/Fine Grey Ware. Its distribution more or less coincides with the pear-shaped pots.

During pre-Mauryan times, i.e. c. 600-300 BC, this type has been found at Atranjikhera period IVC (Gaur 1983: Fig. 5, p. 13); Hastinapura period III (Lal 1956: Fig. 19.LI, p. 62); Kausambi period IIB/III (Sharma, 1969: Fig. 15.X pp. 138, 139, and Fig. I7.XLV, p. 143); Pataliputra period I (Sinha and Narain 1970: Fig. 10.8, pp. 21, 22); Rajghat period IB/IC (Narain and Roy 1977: Fig. 10.10, pp. 39, 40); and Rupar period III (Sharma 1953: Figs. 4,5.17, p. 125).

During the Mauryan period it has been found at Ahichchhatra period II (Ghosh and Panigrahi 1946: Fig. 1.12, pp. 42, 43); Atranjikhera period IVD (Gaur 1983: Fig. 5, p. 13); Hastinapura period III (Lal 1956: Fig. 19.LI, p. 62); Kakrehta period V (Sharma and Mishra 1992: Fig. 19.1, pp. 78, 80); Kumrahar period I (Altekar and Mishra 1959: Figs. 29.1, 2, 3, p. 73); Pataliputra period I (Sinha and Narain 1970: Fig. 10.8, pp. 21, 22); Prakash period II (Thapar 1967: Fig. 26.41, p. 83); Sonpur period II (Sinha and Verma 1977: Fig. 17.13, pp. 38, 39); Sravasti period IIA/IIB (Sinha 1967: Fig. 14.XXBI, p. 45); Taxila period II/III (Marshall 1951: Pls. 122.49, 129e, p. 412); Timbarva (Mehta 1955: Fig. 9.59, p. 15) Tilaura-kot period I (Mitra 1972: Fig. 7.XXA, p. 34) and Ujjain period II (*IAR* 1956-57: 20-28).

During the period immediately after the Mauryans, this shape shows a decreasing distribution and is found only at a few sites such as Atranjikhera period IVD (Gaur 1983: Fig. 5, p. 13); Kakrehta period V (Sharma and Mishra 1992: Fig. 19.1, pp. 78, 80); Kumrahar period II (Altekar and Mishra 1959: Figs. 29. 4, 5, 6, p.73) and Vaisali period II (Deva and Mishra 1961: Figs. 19.80, 80a, pp. 43, 45). It is primarily the shape of the Mauryan period as evident at Vaisali. Other sites might show the presence of this pottery as the result of a probable extension or overlapping of the earlier period.

In the period c. 100 BC-50 AD, this pot has been found only at Maheshwar and Navdatoli (Sankalia *et al.* 1958: Fig. 75.105, p. 148). The type disappears completely and hence can be considered as a temporal marker for the period *c*. 600 BC- 100 BC. This means that the type almost coincides the NBP period.

3. Basin with a Channel Spout (Fig. 22 No. 34)

This type too shows an interesting distribution pattern, which more or less corroborates the earlier evidence regarding the pear-shaped and carinated pots.

During the pre-Mauryan period this pot has been found at Atranjikhera period IVC (Gaur 1983: Fig. 91, pp. 312, 313); Kausambi period IIB/III (MASI

74: Fig. 25.35, pp. 162, 163); Pataliputra period I (Sinha and Narain 1970: Fig. 14.77, pp. 29, 30) and Sravasti period I (Sinha 1967: Fig. 9.XXVIII, p. 37).

During the Mauryan period it has been found at Ahar period IIA (Sankalia *et al.* 1969: Fig. 85.T 234, p. 151); Ahichchhatra period II (Ghosh and Panigrahi 1946: Fig. 1.14, pp. 42, 43); Atranjikhera period IVD (Gaur 1983: Fig. 91, pp. 312, 313); Pataliputra period I (Sinha and Narain 1970: Fig. 14.77, pp. 29, 30) and Tilaura-kot period I (Mitra 1972: Fig. 9.XLII, p. 41).

In the post-Mauryan period, this type seems to have disappeared completely.

4. Lid with a Ledge (Fig. 24 No. 45)

This type has been found in its simplest form at Early Historic Balathal and is an interesting shape. It shows a lot of morphological modifications in the later periods and has a widespread distribution in comparison to the simpler type. Here, only the former has been considered for discussion and not its more complicated later counterparts.

During the pre-Mauryan period such a lid has been found only at Kausambi period IIB/III (MASI 74: Fig. 22.90 pp. 155, 156)

During the Mauryan period it has been found at Ahar period IIA (Sankalia *et al*. 1969: Fig. 87.T242, p. 151); Sonkh period II (Hartel 1993: 386 II.88, p.365); Sonpur period II (Sinha andVerma 1977: Fig. 31.15, pp. 69, 70) and Tilaura-kot period I (Mitra 1972: Fig. 16.LXIV, p. 48). The specimen found at Tilaura-kot is almost identical with that from Balathal.

In the post-Mauryan period, it has been found only at Maheshwar and Navadatoli period V (Sankalia *et al*. 1958: Fig. 71.98A p. 146).

5. Votive Tank/Lamp (Fig. 26 No. 48)

This type, though termed as a votive tank, looks very similar to a lamp. It appears from the Mauryan period onwards and continues till the 1st century AD.

During Mauryan times, this type has been found at Ahar period IIA (Sankalia *et al.* 1969: Pl. XIII.2, Fig. 107.3, p. 181) and Sonkh period II (Hartel 1993: 1, 2, 3, p. 195).

In the post-Mauryan period, it has been found at Hastinapura period IV (Lal 1956: Fig. 23.2, pp. 69, 70); Rupar period IV (Y.D. Sharma 1953: Fig. 6.30, p. 128); Sonkh period III (Hartel 1993: 387 II.110, p. 366) and Taxila period V (Scytho-Parthian) (Marshall 1951: Pl. 136.s, p. 463).

6. Bell-Shaped Lids (Fig. 24 No. 42)

Although these lids have been found in the Early Historic context at Balathal, they have been dated to the medieval period at other sites such as Baroda periods III, IV and V (Subbarao 1953: Figs. 17.39, 39a, 39b and 39c, p. 41, Figs. 19.67, 67a, 67b, 67c, 67d, p. 46); Dwarka period III (Ansari and Mate 1966: Figs. 20.79, 81, pp. 73-75, Fig. 26.127, pp. 83, 84); Nagara period IV (Mehta 1968: Figs. 22. 50, 51, 54, 55, p. 41) and Sonkh (Gupta Period) (Hartel 1993: 407 VI.84, p. 375). However, its date has been confirmed in contrast to the earlier understood time frame on the basis of its occurrence in the stratified context at Balathal. Other corroborative evidence supporting this observation is the presence of NBP and BSW sherds, and un-inscribed cast copper coins in the concerned layers.

7. Double Carinated Pot with a Channel Spout (Fig. 34 Nos. 72, 73)

This is a very unique variety of pot, and, so far it has not been reported from any other site in India barring a similar kind from Baroda belonging to periods III and IV (Subbarao 1953: Fig. 18.65, p. 44, 19.66, p. 44), which are medieval in date.

Sunil Gupta (1997: 63) compares this type with the Greco-Roman lamp from the early centuries of the Christian era. It may be noted that examples of this type at Balathal have been found in the layers belonging to *c.* 3rd century BC, much earlier to the period of Roman contact with India. Secondly, a Roman lamp found at Ter (Dhavalikar 1999: 149 Fig. 5.12) looks quite different from the specimen found at Balathal. Thirdly, the XRD analysis indicates its provenance in the Ganga valley, disproving all possibilities of Roman origin. Dhavalikar and Sonawane (personal communication) opine that this pot has a strong likelihood of being a liquid pourer rather than a lamp.

Apart from these important varieties which belong to a fixed time frame, there are certain decorations such as the ‘swastika’ symbol or concentric circles

which are found on the Grey Ware vessels at Balathal.

'Swastika' as a decorative motif has been found at various places such as at Hastinapura on Painted Grey Ware, at Ahichchhatra in the form of a stamp, at Nasik and Jorwe in the inscribed form, at Bairat as a stamp and at Sambhar as a chain of decorative motifs (Ramachandran 1961). It also occurs right from the late levels of the PGW to the Kushana period. At Sonpur its presence has been noted in the Mauryan levels in the form of graffiti on a dish made in Black Ware (Sinha and Verma 1977: Fig. 40.4, pp. 87, 88). This helps to re-determine its period to *c*. 300-150 BC.

To make it simpler the above mentioned list is put together in a tabular form below.

Site	**Pre-Mauryan (600-300BC)**	**Mauryan (321-150BC)**	**Mauryan–Sunga (150BC-100BC)**	**Sunga (100BC-50AD)**	**Kushana (50-200AD)**	**Not Specific**
Ahar		Period IIa 1, 6, 7, 4			Period IIb	Period Ib/Ic (Chalcolithic)
Bagor						Phase III 600 BC to 200 AD 1
Iswal						From Surface Explorations 3
Nagari		Period I	Period II (Sibi)	Period III (Malwa)	Period IV (Kshatrapa)	Context Unknown 1
Rairh		1, 6				
Dwarka			Period I	Period I	Period II	MEDIEVAL (Period III) 5
Timbarva	Period I 1, 2	Period I 1, 2	Period I 1, 2	Period II 1	Period II 1	
Avra	Period III 1	Period III	Period III	Period III	Period IV	
Kakrehta	Period IV	Period V 1, 2	Period V 1, 2	Period V 1, 2	Period VI	
Maheshwar & Navdatoli	Period IV	Period IV	Period IV/V	Period V 2, 6	Period V	Surface/ Non-specific
Nagda	Period II	Period III 1				
Tripuri	Period II 1	Period III 1	Period IIIA 1	Period IV	Period IV	
Ujjain		Period II 2		Period III	Period III	
Ahichchhatra	Period I	Period II 1, 2, 4L	Period II/III 1		Period IV/V/VI	
Atranjikhera	Period IVC 1, 2, 4	Period IVD 1, 2, 4	Period IVD 1,2	Period IVD	Period V	
Bhita	Period I	Period II 1				Period IV (Gupta) 1
Hastinapura	Period III 1, 2, 3	Period III 1, 2, 3		Period IV 7	Period IV 7	Period V (1100-1400 AD)
Kausambi	Period IIB/III 1,2, 6, 4	Period III	Period III	Period III	Period III (Sub-Period VIII)	

Site	Pre-Mauryan (600-300BC)	Mauryan (321-150BC)	Mauryan–Sunga (150BC-100BC)	Sunga (100BC-50AD)	Kushana (50-200AD)	Not Specific
Kumrahar		Period I 1, 2	Period II 1, 2	Period II 1, 2	Period III	Period IV (300- 500 AD) 6
Pataliputra	Period I 2, 4	Period I 2, 4	Period II	Period II	Period II	
Rajghat	Period IB/IC 1, 2	Period II	Period II		Period III	
Sonkh	Period II 1, 3, 6, 7	Period II 1, 3, 6, 7	Period II 1, 3, 6, 7	Period III 7	Period IV/V	Gupta 5
Sonpur		Period II 1, 2, 6		Period III 1		
Sravasti	Period I 4	Period IIA/B 2, 3	Period IIC			Period III/ Un-stratified
Tilaura-kot	Period I 1, 2, 6, 4	Period I 1, 2, 6, 4				
Vaisali (1)	Period IA	Period IB	Period II 2	Period II	Period III	
Vaisali (2)		Period II 1, 2, 4	Period III 1	Period III	Period III	
Rupar	Period III 1, 2	Period III/IV	Period IV 7	Period IV 7	Period IV	
Taxila	Period I	Period II/III 1, 2	Period IV	Period V (Scytho-Parthian) 7	Period VI	B
Nasik		Period IIA 1	Period IIB 1	Period IIB 1	Period III (Roman Contact)	Muslim Maratha
Prakash	Period II 1, 2	Period II 1, 2, 6	Period III	Period III	Period III	Period IV (500 – 1200 AD)

Key to the Table

1 = Pear shaped pots; 2 = Carinated pots with inverted tapering rim and rounded base; 3 = FGW dishes with central stamp; 4 = Spouted basins in RW; 5 = Bell shaped lid; 6 = Ink pot lid; 7 = Votive tank with lamplets on rim

Putting all this evidence together, we can conclude that the ‘prime-time’ occupation at Balathal took place between 400 BC and 150 BC This is corroborated with the help of other antiquities such as amethyst, crystal, etched carnelian beads, un-inscribed cast copper coins, mother-goddess figurines, and head-scratchers, which belong to this period (Dalal 2001). Secondly, the uniformity among pottery types at the above mentioned sites strongly suggests a regular inter-site contact with Balathal.

This is also indicative of a probable central polity responsible for such vigorous inter-site traffic. In the light of the C-14 dates available from the Early Historic period of Balathal, one can infer that this ruling ‘central polity’ could not be any other except the Mauryas. The exact nature of antiquities found at Balathal, Taxila (Mauryan period) and Mathura [Sonkh] and similarities between pottery from Balathal, Pataliputra, Sonpur, Vaisali, Tilaura-kot, and Ujjain further reiterate the former’s importance as a settlement of prominence during the Early Historic period.

Another strong possibility is that the site could have come into existence before the Mauryas as truly speaking Mauryas were not the first strong central polity, but they inherited the already established empire of the Nandas, who in turn inherited it from the Sisunaga dynasty (Nilakanta Shastri 1967).

In all probability, Balathal was an iron re-working workshop. It had all the necessary pre-requisites for this, such as permanent source of water, availability of firewood/fuel and a rich source of iron ore at Iswal which is only 50 km to the west of Balathal. Iswal has thick deposits of iron slag, which show that it was an iron-smelting site.

To sum up, one can speak of Balathal being a vibrant settlement in Mewar during the Pre-Mauryan/Mauryan period. It lost its position after the site was destroyed by a conflagration during the peak of its activities in the Mauryan period itself. Although it remained under habitation, it lost its importance as is evident from the absence of premium pottery of the later period such as the Red Polished Ware prevalent at other sites in the region. The decrease in the amount of pottery and in the number of structures in the succeeding layers also suggests a corresponding decrease in the population.

Unfortunately, the data available is fragmentary since the archaeology of Early Historic Mewar is loosely known due to limited number of excavated sites. Further work needs to be carried out within this region to develop a corpus of data concerning the study of Early Historic Rajasthan in general and Mewar in particular to substantiate the hypotheses put forward in this thesis.

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Archaeozoological Aspects of the Prehistoric Cultures of Western India

P.K. Thomas

The author has great pleasure in writing this paper for the Felicitation Volume of Professor V.N. Misra, since he has had the great opportunity to be with Professor Misra, *Guruji*, for the last 35 years as a student and later on as a colleague. The author was associated with most of the archaeological programmes conducted by Prof. Misra that gave him further insight into many branches of Archaeology. The author was awarded Ph.D. Degree in Archaeology in the year 1977 for the dissertation entitled "Archaeozoological Aspects of the Prehistoric Cultures of Western India" under the able guidance of Prof. Misra, the then, Head of the Archaeology Department of the Poona University. This thesis is first of its kind in India. Professor Misra's contribution in developing this branch of Archaeology at the Deccan College is enormous. He has helped the author in various ways in bringing up the Archaeozoology laboratory at the Deccan College. Since Prof. Misra had limitations in this branch, he with the help of late Professor H.D. Sankalia invited a leading Archaeozoologist of that time, Professor A.T. Clason, of the Bio-archaeological Institute, Groningen, The Netherlands to Deccan College and thus making the expert advice of Professor Clason available to the author.

Many persons have helped the author in the preparation of this thesis. It was his teacher, late Professor K.T.M. Hegde, at Baroda who advised the author to work for his Ph.D. at the Deccan College under the supervision of Professor V.N. Misra. The author is thankful to Professors H.D. Sankalia, S.B. Deo, M.K. Dhavalikar, Z.D. Ansari, S.N. Rajaguru, M.L.K. Murty, G.L. Badam, R.N. Mehta and D.R. Shah and R.B. Warke and S.R. Prabhu for their help in various ways.

The thesis is divided into seven chapters: (1) Significance and History of Archaeozoological Studies; (2) The Sites, Their Ecological Setting and Cultural Sequence; (3) Methodology; (4) The Animals; (5) Interpretation; (6) Bone Tool Industry of Bagor and Tilwara; and (7) Conclusion. The thesis has also 31 Plates, 51 Figures, 49 Tables and 212 Pages. A summary of each chapter is given below.

Chapter 1. Significance and History of Archaeozoological Studies

Animals while living, as also after death play an important role in human life, and have done so right since the emergence of man as a cultural being. Unlike the plant materials, animal remains often survive in good condition and in large quantities in the archaeological record. Such remains therefore, constitute a very valuable source of evidence for reconstructing the culture and environment of early populations. Since the earliest times, man has depended on animals (including fish, birds, insects, etc.) for his food. For hunter-gatherer societies animals constituted a major source of food. Man began his hunting career with preying on small land mammals and by the beginning of Acheulian stage was able to hunt large mammals (Pfeiffer 1969:138-139). In the Upper Palaeolithic period and particularly during Mesolithic period trapping, snaring and catching of birds and of fish also assumed considerable importance. From the beginning of the Neolithic period, the transitional stage from food procurement to food production, animals such as sheep, goat, cattle, pig etc. were domesticated. From this stage onwards man probably also began using animal milk as a source of food. Our knowledge of the economic practices and food habits of the prehistoric populations is largely based on the animal remains preserved in the archaeological record.

Animal bones and antlers were used as raw material for making tools. Among the implements made of these materials are spear points, harpoons, awls, needles, fish hooks, hafts of arrowheads, spear heads and knives. Animal hides have been used since the Mousterian period for making shelters. From at least Upper Palaeolithic times onwards there are evidences indicating the use of animal skins for clothing. Animal bones, teeth and shells were used as ornaments. Bone beads and pendants are found at Upper Palaeolithic sites. Necklaces made of teeth are known from Neanderthal sites. Dentallium shell beads are known from Natufian sites in Palestine.

After man learnt to domesticate the animals, their role further increased in his economy. Now, besides supplying food, they also became a source of energy. Oxen, horses, buffaloes, camels, etc.

have been used in a variety of agricultural operations like ploughing, running irrigation devices and for threshing harvested crops. These and other animals were used as pack animals as well as for riding. Several of them were used for drawing carts and chariots as also for running oil presses. The relationship between man and animals transcended the purely utilitarian level even during the hunting stage. Man felt a close emotional affinity to animals, which formed the source of his food and shared his environment. Because of this bondage some animals were buried along with human, in many places.

The study of animal remains is quite important for reconstructing prehistoric environments and for determining climatic changes. Animal life constitutes a very important aspect of the environment, especially in the case of prehistoric societies where wildlife was far more intimately connected to life than is the case with agricultural and industrial societies. Wild animals are adapted to specific ecological settings, and the identification of animals from skeletal remains can help in reconstructing not only the faunal world, but to a certain extent also the vegetation and climate of the period in which these animals flourished.

A Brief History of Archaeozoological Studies

The history of Archaeozoological research goes back to more than 100 years. The importance of the relationship between the animal world and the prehistoric human population is recognised by Charles Darwin the *Variation of domestic plants and animals under domestication* (1886) and the *Origin of Species* (1869), and Rutimer *Die Fauna der Pfahlbauten der Schweiz* (1861). The latter comprised three important aspects of archaeozoological studies: (1) the discussion of the differences between the wild parent-species and the domesticated species; (2) the history of domestic species; and (3) the sequence of development of stock breeding and hunting of different cultures in one restricted area (Clason 1973).

During the last three decades significant changes have taken place in the field of archaeology. The archaeologists realized the scientific potential of the biological materials in the archaeological contexts. The archaeozoologists have paid much attention to the ecology, socio-economy, hunting methods and meat-food processing, animal pathology, etc. They have developed a number of new methods of quantifying the biological data from the archaeological sites. The latest developments in archaeozoological research are the introduction of statistics, computerization and standardization in the presentation of zoological data.

Archaeozoological Studies in India

In India, the antiquity of vertebrate faunal studies goes back to the early part of the 19th century. Much of this work was on the fossil material from various geological deposits. Though a large number of Palaeolithic sites are discovered in India, stratified faunal assemblages along with cultural remains were identified from only a few sites. Essentially, faunal remains associated with human cultures differ from fossils associated with geological formations. The animals represented in fossil form are mostly extinct ones; they are often not derived from the interaction of animals with humans. However, faunal assemblages from archaeological sites are mostly the direct result of man-animal interaction - be it economic, social, and ritual, etc. - within a specific ecological setting. Therefore, an Archaeozoologist is more interested in understanding the marks left by past humans, with specific reference to animal remains, in the adaptation patterns of prehistoric human groups.

In South Asia one of the first reports on faunal assemblage from a stratified archaeological context (man-made tools in association with faunal remains) was published by Lydekker in the year 1886; this material came from Billa Surgam Caves in Kurnool district of Andhra Pradesh, dating to the (Late Pleistocene) Upper Palaeolithic Phase (Lydekker 1886a, 1886b). Almost 50 years later, faunal remains of the protohistoric phase were reported in 1931 by Sewell and Guha from Mohenjodaro and slightly later by Prashad (1934) from Harappa.

In the 1950s Bhola Nath, J. C. George and J. Eapen worked on faunal material excavated mostly from the protohistoric sites. Bhola Nath worked on the materials from sites such as Maski (1957), Sarnath (1958) and Taxila (1959), while George studied the material from Nasik and Jorwe (1955). In 1960s Nath studied the faunal remains from Harappa (1962), Rangpur (1962-63), Brahmagiri (1963b), Nagda (1966), Adamgarh (1967), Rupar and Bara (1968) and Alamgirpur (1969). Eapen's work at Nevasa (1960), Clutton-Brock's work at Langhnaj (1965), Shah's study of material from Chandoli

(1965), Devanimori (1966), Nagara (1968a), Kaudinyapura (1968b), Ahar (1969), etc., and Alur's work at Sangankallu (1969) are worth mentioning.

During this period the customary pattern of faunal reporting was to give a species list of animals identified at a site without any further remarks about the locational contexts or stratigraphy, faunal quantification, metrical analysis, etc. One of the reasons for this was the lack of awareness among the archaeologists about the scientific potential of the faunal material. In this process the faunal collections were also made in a biased way; the archaeologists used to collect only the well-preserved and large sized bones from their excavations. The entire material was never sent to the zoologists or anthropologists who were partly engaged in this study. Only a few selected bones from the retrieved material were sent to the persons studying the faunal remains. Another reason for the lacuna was the lack of interaction between the excavator and the scientists studying faunal material. So their interpretations were not archaeologically oriented. Biologists were never associated with excavation teams to understand the archaeological formation processes. Much of this work was carried out without the help of proper reference skeletons of modern domestic and wild animals, which is a prerequisite for any archaeozoological work. In the process valuable information was permanently lost.

Chapter II. The Sites, Their Ecological Setting and Cultural Sequence

I. BAGOR

Bagor is a large and prosperous village in the Bhilwara district of Rajasthan. It is located in a bend of the river Kothari, a tributary of the Banas, about 25 km west of the town of Bhilwara. The prehistoric site is situated on a large sand dune, locally known as Mahasati. The dune measures about 200 m. east-west and 150 m. north-south and is nearly 10 m. high from the river bed level. Kothari is a seasonal river and has flowing water only during the rainy season. A large depression at the north-eastern edge of the village forms a vast tank and retains water throughout the year.

Bagor is located in the heart of the undulating rocky plains of Mewar, on the eastern side of the Aravalli hills. The rainfall in this area is about 60-70 cm. per annum. Cultivation is largely confined to alluvial tracts along the river banks. The main trees are khejri (*Prosopis cineraria*), babul (*Acacia arabica*), dhak (*Butea frondosa*), and date palm (*Phoenix sylvestris*); bushes of kair (*Capparis deciduas*) and ber (*Zizyphus jujuba*) are very common. The region has extensive pasture land, and is ideally suited for pastoral economy. There are communities which practice stock breeding as a full time occupation. The Rewaris breed camels and Garis keep large flocks of sheep. Wild animals such as blackbuck (*Antilope cervicapra*), nilgai (*Boselaphus tragocamelus*), wild boar (*Sus scrofa*), hare (*Lepus nigricollis*), fox (*Vulpes bengalensis*) and jackal (*Canis aureus*) are still found in some areas (Rajputana Gazetteers, 1908). Among the birds, there are peacock, patridge, sand grouse, pigeon and parrot. The most common fish are the *rohu*, the *gunch* and the *lanchi*.

The site of Bagor was discovered by V.N. Misra and L.S. Leshnik in January 1967. The site was excavated jointly by the Department of Archaeology, Poona University and Department of Archaeology and Museums, Government of Rajasthan under the direction of V.N. Misra from 1968 to 1970 (Misra 1973). The entire deposit of the site was formed of blown sand. It was not possible to observe minute stratigraphy. However, five broad layers could be recognized. The habitation deposit has a thickness of about 1.50 m. On the basis of changes in the material culture, three phases of occupation have been recognized at Bagor.

<u>Phase I</u>

It is represented in the deposit below 100cm. from the surface and has a thickness of about 50-80 cm. It has yielded microliths and animal bones in large quantities, one human burial, stone-paved floors, stone hammers, querns and rubbers. Three C-14 dates from this phase are: TF-786, 6245 ± 200 (6545 ± 200) BP; TF-1007, 5620 ± 130 (5785 ± 130) BP; Tf-1011-12, 5090 ± 85 (5235 ± 90) BP.

<u>Phase II</u>

This phase is represented between 70 and 100 cm. depth from the surface and has a deposit of 30-50 cm. In this phase the quantity of microliths and animal remains begins to decline. Pottery and copper objects make their appearance. Pottery is hand made and incision decorated. Beads of agate, carnelian and garnet are common. Three human burials were found in this level. Two C-14 dates from this phase are TF-1009, 4585 ± 105 (4715 ±

105) BP; and TF-1005-1006, 3945 ± 90 (4060 ± 90) BP.

Phase III

Cultural material of this phase is obtained down to a depth of 70 cm from the surface. Microliths and animal bones greatly decline in quantity. Pottery is wheel-made. Glass beads, stone pendants brick fragments and arrowheads and several bits of iron were found. No radiocarbon dates are available for this phase.

II. TILWARA

Tilwara is a small village, situated on the left bank of the river Luni, 16 km west of the town Balotra, in the Barmer district of Rajasthan. The prehistoric site is locally known as Bidra. The landscape essentially is a flat alluvial plain dotted with sand dunes. The rainfall is meagre, less than 40 cm. per annum. Agriculture consists of millet crops. However, the economy is mainly based on pastoralism in which cattle, sheep and camel are important animals.

The flora of the District Barmer is that of a hot desert region. The common trees and shrubs are khejri (*Prosopis cineraria*), rohira (*Tecoma undulata*), kair (*Capparis deciduas*), phog (*Calligonum polygonoides*), akra (*Calotropis procera*), jal (*Salvadora persica*), ber (*Zizyphus jujuba*), bordi (*Zizyphus rotundifolia*) and three varieties of *Acacia* (Barmer district Gazetteer, 1962).

Majority of the big game animals are extinct or they are in the process of extinction. Panthers (*Panthera pardus*), hyaenas (*Hyaena hyaena*) are still found but in decreasing numbers. The other wild animals found in this region are wild boar (*Sus scrofa*), wolves (*Canis lupus*), sambar (*Cervus unicolor*), chital (*Axis axis*), blackbuck (*Antilope cervicapra*), chinkara (*Gazella bennetti*), red lynx (*Felis lynx*), jackal (*Canis aureus*), desert fox (*Vulpes bengalensis*) and hare (*Lepus nigricollis*). Among the birds crow, sparrow, pigeon, mynah, blue jay, hoopoe, bulbul and robin are found everywhere. The main varieties of fish caught are *lanchi*, *mural*, and the *rohu*.

Tilwara was discovered by V.N. Misra and L.S. Leshnik in January 1967. It was excavated jointly by the department of Archaeology, Poona University and the Department of Archaeology and Museums, Government of Rajasthan under the direction of V.N. Misra in 1967. No clear layers could be recognised because of the sandy nature of the deposit. The habitation deposit has a thickness of 50 cm. Two cultural phases are noticed here. Phase I is characterised by microlithic tools, animal bones and stray potsherds. The deposit between 20 cm and 50 cm below the surface represents Phase I. The top 20 cm deposit belongs to Phase II. In this the microlithic industry declines and wheel-made pottery, pieces of iron, glass beads and shell bangles have been found. No radio-carbon dates are available from this site.

III. PRABHAS PATAN

The site of Prabhas Patan or Somnath is located on the coast of Saurashtra about 85 km to the south of the town of Junagadh, in Gujarat. It lies on the right bank of river Heran. The annual rainfall in this area is about 100 cm. This region is very fertile and has a thick vegetation cover. Prabhas Patan was first excavated in 1956 jointly by the Gujarat State department of Archaeology and the Department of Archaeology and Ancient Indian History, M.S. University of Baroda. In 1972 this site was re-excavated jointly by the Deccan College, Poona and the Gujarat State Department of Archaeology.

The excavation at Prabhas Patan shows a continuous habitation from the Chalcolithic period down to the early historic times. The deposit was divided into 17 layers, which reveal, on the basis of changes in material culture, four main cultural periods. Layer 17 is virgin soil and layer 16 is a flood deposit. One C-14 date from layer 16 is PRL-90, 4235 ± 110 (4360 ± 115) BP. Period I represented by layer 15, belongs to Harappan culture. One radio-carbon date available for this period is TF-1267, 4280 ± 105 (4405 ± 110) BP.

Period II and III belong to post-Harappan cultures and are characterised by stone structures, painted wares, blade industry and copper implements. Animal remains are abundant in these periods. Period II is marked by the presence of the typical Prabhas ware and is represented in layers 12-14. Period III is represented in layers 8-11. Period IV is early historic and is represented in layers 1-7. On archaeological evidence this period is dated from 4^{th} century to 1^{st} century BC.

IV. KHANPUR

The site of Khanpur is situated on the bank of the river Machhu in the Morbi Taluka of Rajkot District, Gujarat. The average annual rainfall in this

district is about 60 cm. per annum. The wild animals found in this region are wild ass (*Equus hemionus*), panther (*Panthera pardus*), hyaena (*Hyaena hyaena*) wolf (*Canis lupus*), jackal (*Canis aureus*), fox (*Vulpes bengalensis*), wild pig (*Sus scrofa*), chital (*Axis axis*) and nilgai (*Boselaphus tragocamelus*).

Y.M. Chitalwala, a research scholar of the Department of Archaeology, Deccan College, explored the site. The deposit is approximately 3-4 m. in thickness. In addition to the animal bones, both Harappan and post-Harappan wares have been collected. The post-Harappan phase is represented by the Lustrous Red Ware.

Chapter III. Methodology

The animal remains from Bagor and Tilwara were very fragmentary and badly preserved. After mechanical cleaning the broken bones were mended as far as possible. The Prabhas Patan material was less fragmentary, but it has thick incrustations of calcium carbonate and earth. Some of the bones had to be cleaned with 2% acetic acid. The next step of the work was to select the identifiable bones from the lot. Subsequently, the bones were separated according to their anatomical positions and grouped according to their structure and size.

Size cannot be the criteria for identification of bones since some of the animals have the same size range like the *Bos indicus* (cattle) and *Bubalus bubalis* (buffalo). For this the structural differences in the bones of different animals have to be studied carefully. For the same reason the author has visited the Zoological Survey of India, Calcutta; Department of Ancient History and Archaeology, M.S. University, Baroda and the reference collection of the Deccan College, Pune. The structural differences noticed in the bones such as horns, mandible, scapula, humerus, radius, ulna, pelvis, femur, tibia, astragalus, calcaneum, metacarpal, metatarsal and first fore phalanx between *Bos indicus* and *Bubalus bubalis* are illustrated with the help of diagrams in the original text (Thomas 1977).

Likewise, the osteological difference between sheep (*Ovis aries*) and goat (*Capra hircus*) has been worked out by Boessneck (1971). This has been reconfirmed by the author for the Indian species giving details of bones such as skull, scapula, humerus, radius, ulna, pelvis, femur, astragalus, calcaneum and metapodia. The author also worked out the differences in the antlers of the four important deer species such as *Cervus unicolor*, *Cervus duvauceli*, *Axis axis* and *Axis porcinus*. This is illustrated with the help of diagrams in the thesis under review. The horns of *Antilope cervicapra* and *Gazella gazella* have also been illustrated.

The nomenclature of the species described in the text is after Ellermann and Morrison Scott (1966). The taxonomic positions of the species represented in the bone material from the four sites are given as per the order, family, sub family, genus and the species.

Measurements of the Bones

The measurements of bones can help in the identification of the species, in estimating the size of the animal and also in differentiating breeds, sex groups etc. (Chaplin 1971). The measurements followed in the text are after Duerst (1926) with modifications made by A.T. Clason (personal communication). The parameters used in the measurements of various bones are illustrated with the help of diagram. For skull there are 37 measurements; mandible 23; horn core 5; scapula 5; humerus 8; radius 8; metacarpus/metatarsus 9; femur 8; tibia 6; astragalus 6; calcaneum 4; phalanx I 6; phalanx II 6; phalanx III 3; Centrotarsal 1; atlas 4; axis 4; and Pelvis 1.

A number of measurements have been taken on skeletons of modern animals, both domestic and wild. Also the mean and range of all these measurements have been worked out. The measurements of important species are given in the text in table forms (14 tables).

Quantitative analysis of the bone finds is important for the economic interpretation of any prehistoric settlement. A number of methods have been worked out by different authors regarding this particular problem. The ‘fragment method’ (Chaplin 1971), ‘Live-Weight’ (Clason 1971), ‘Weight Method’ (Kubasiewicz 1956) and ‘Minimum Number of Individuals’ (White 1953) are some of them.

The age groups of animals have been determined on the basis of the eruption and wear of dentition and the epiphyseal fusion of bones (Silver 1969; Habermehl 1961; Cornwall 1974; Chaplin 1971; Ryder 1968; Schimid 1972).

Chapter IV. The Animals

Animals formed a very important element in the economic life of the prehistoric societies. The nature of the fauna represented at a site depends on the environmental zone in which the site is located. Thus, different species of animals have been found from Bagor, Tilwara, Prabhas Patan and Khanpur. The important domestic animals identified from these sites are cattle, buffalo, sheep, goat, pig, and dog. In addition, the inhabitants hunted a number of wild animals like several species of deer and antelope, hare, porcupine etc. They also exploited the avian and aquatic fauna. Among the sites mentioned above Bagor and Prabhas Patan yielded a larger number of animal remains.

BAGOR

A part of the faunal assemblage from Bagor has been studied by K.R. Alur (manuscript 1971). The maximum number of bones came from Phase I. Of the total number of identifiable bones, 78.29% come from Phase I, 19.06% from Phase II and 2.65% from Phase III. The bones bear cut marks and charring. The following are the domestic animals identified from this site. *Ovis orientalis* (now the nomenclature changed to *Ovis aries*), *Capra hircus*, *Bos indicus*, and *Sus scrofa* (now changed to *Sus domesticus*). The wild animals identified are *Bubalus bubalus* (now, *Bubalus arnee*), *Cervus unicolor*, *Axis axis*, *Antilope cervicapra*, *Gazella gazella* (now, Gazella *bennetti*), *Lepus nigricollis*, *Vulpes bengalensis*, *Herpestes edwardsi*, *Hystrix indica*, *Rattus* sp., tortoise and fish.

Sheep and Goat (*Ovis aries* and *Capra hircus*)

These were the predominant domestic animals of the prehistoric inhabitants of Bagor. . The identifiable bones of these animals in Phase I (Mesolithic) are 1143 (64.43%) of the total number of bones. In Phase II and III they are 241 (62.73%) and 43 (78.34%), respectively. All parts of the appendicular skeletons and dentition of these animals are represented at the site. Often drill marks are noticed on the phalanges of these animals, probably used as pendants.

The humped cattle (*Bos indicus*)

In comparison to the occurrence of this animal in the Neolithic-Chalcolithic cultures, the Mesolithic Bagor yielded only a few bones of *Bos indicus.* This is about 15.71% of the total collection of bones from the site. Cut marks and charring are noticed on a majority of bone fragments. They are represented in all the three phases. The identifiable fragments are 278 (15.67%) in Phase I, 74 (17.13%) in Phase II and 4 (6.67%) in Phase III.

Domestic Pig (*Sus domesticus*)

This animal is represented in both wild and domestic forms. The majority of the bones of this animal come from the first two phases. They are represented by 3.72%, 4.17%, 3.33% in Phases I, II and III, respectively. Complete post-cranial parts and teeth are represented. Bone with cut marks and charring are often found in the collection.

Wild buffalo (*Bubalus arnee*)

Buffalo is identified only from Phase I. Fourteen fragments of bones have been identified. Basal half of flat horn core is also represented. The broken pieces of bones are mainly from the meat bearing parts such as humerus, radius, ulna, femur and tibia.

Sambar (*Cervus unicolor*)

Sambar, the largest of all the Indian deer species, is represented in Bagor. The identifiable bone fragments are 76 (4.29%), 17 (3.93%) and 2 in Phases I, II and III, respectively. Very few long bones are represented. Mostly the fragments belong to the metapodials and phalanges.

Chital (*Axis axis*)

The remains of chital are identified from the first two phases, but they are abundant in Phase I. There are about 85 (4.29%) pieces in Phase I and 17 (3.93%) in Phase II. All the bones are represented. The bones also show human activity on them like cut marks and charring. Drill marks are observed on some of the phalanges.

Blackbuck (*Antilope cervicapra*) and Chinkara (*Gazella bennetti*)

A majority of the bones of these animals were identified from the first two phases. There was no reference skeleton of blackbuck at the author's disposal and also these bones were very fragmentary. Since the identification was not possible with certainty for these two species, the bones of these animals have been treated together. The bones are 79 in Phase I, 20 in Phase II and 4 in Phase III. A majority of the bones show human activity on them.

Hare (*Lepus nigricollis*)

Sixteen bones of hare were found, 10 from Phase I and 6 from Phase II. They are broken pieces of

humerus, ulna, pelvis, tibia and calcaneum. They are also charred.

Fox (*Vulpes bengalensis*)
Only thirteen bones of fox were identified, 9 from Phase I and 4 from Phase II. These are the fragments of scapula, tibia, metapodia and phalanx. Some of these are charred.

Mongoose (*Herpestes edwardsi*)
Fourteen fragments of limb bones and mandibles have been identified, all from Phase I. The fragments belong to humerus, femur, tibia, astragalus and calcaneum. Some of these bones are charred.

The other animals associated with the Bagor culture are rats, tortoises, fish and frogs. Complete intact bones of rats are detected in all the digs. They may not be contemporary with the prehistoric occupation, but may be later intrusions. The tortoise and fish were part of the food economy of the prehistoric inhabitants of Bagor. A few limb bones and fragments of carapace have been found in all the layers. Probably the species is *Chitra indica*. A number of fish vertebrae belonging to a smaller variety of fresh water fish were detected. They were well preserved.

TILWARA
A meagre amount of animal remains was found at Tilwara. Hardly thirty-five bones could be identified from both the phases. A majority of the bones belong to *Bos indicus*. The other animal identified at this site is *Ovis/Capra*, probably sheep. The bones identified are humerus, metatarsals and phalanges and also fragmented dentition. Another interesting find from this site is a broken 3rd molar of *Equus* species from Phase II.

PRABHAS PATAN
Animal remains were collected mainly from the first three periods. However, they are more common in Period III. Of the total collection of bones, 9.93% come from Period I, 37.59% from Period II and 52.48% from Period III. Though many bones have been cut or broken, they are better preserved than the bones from Bagor and Tilwara. The animals identified from this site are cattle (*Bos indicus*), buffalo (*Bubalus bubalis*), goat (*Capra hircus),* sheep (*Ovis aries*), pig (*Sus domesticus*), barasingha (*Cervus duvauceli*), chital (*Axis axis*), chinkara (*Gazella bennetti*) and porcupine (*Hystrix indica*). In addition to these mammals, fish, tortoise, crab and molluscan shells are also represented.

Cattle (*Bos indicus*)
As in the other protohistoric sites in India, the maximum number of bones recovered in the excavations at Prabhas Patan belongs to cattle. In the total collection of identifiable bones, 54.69% belongs to this animal. They represent 34.04%, 59.17% and 54.82%, in Periods I, II and III, respectively. All the parts of the skeleton and dentition are identified at Prabhas Patan. Both young and adult animals are identified. Some of the bones of this animal also show cut marks and charring.

Buffalo (*Bubalus bubalis*)
The second most common animal represented at this site is buffalo. Of the total identifiable bones from Prabhas Patan 13.69% belong to buffalo. They represent 31.48%, 13.45% and 10.51% in Periods I, II and III, respectively. Some of the bones of this animal are also found with cut marks and charring.

Sheep and Goat (*Ovis aries* and *Capra hircus*)
The identifiable bones of sheep and goat together form 7.26% of the total collection of bones from Prabhas Patan. These are represented in all the three periods and constitute 5.56%, 9.05% and 6.30% in Periods I, II and III, respectively. The bones of these animals are scarce compared to other domestic animals of the site. The smaller size of the bones might be the reason for their being ignored in the collection. Majority of the bones have cut marks and charring. Both young and adult animals were killed for food.

Domestic and wild pig (*Sus domesticus* and *Sus scrofa*)
It was rather difficult to separate domestic and wild pig bones. Therefore, they have been treated together and they form 7.91% of the total collection of bones. A consistent increase in the proportion of these species from Period I onwards is noticed. The percentage of bones in Periods I, II and III is 2.78%, 4.40% and 11.38%, respectively. Majority of the bones are charred.

Chinkara (*Gazella bennetti*)
A very small number of Chinkara bones have been identified at Prabhas Patan. They constitute only 2.94% of the total collection of bones. Their period-wise distribution is 0.92% in Period I,

3.42% in Period II and 2.98% in Period III. A majority of the bones are partly or completely charred.

Barasingha (*Cervus duvauceli*)
This animal is identified from all the periods at Prabhas Patan. However, a large concentration is found in Period I. The total identifiable bones of this animal constitute 7.08% of the bones collected at the site. They represent 11.11%, 5.62% and 7.36% in Periods I, II and III, respectively. Many of the bones had cut marks and charring. The broken tips of antlers were used as tools.

Chital (*Axis axis*)
Chital is represented in all the periods at Prabhas Patan. However, their proportion is higher in Period I. Chital bones constitute 6.43% of the total bones collected at the site. Their proportion in Periods I, II and III is 11.11%, 4.89% and 6.65%, respectively. Bones with cut marks and charring are also noticed. Several antler fragments are found and in some the tip is ground and charred, indicating fire hardening and grinding in the manufacture of tools.

Porcupine (*Hystrix indica*)
This animal is represented by two mandibles, one each in Periods II and III, respectively. No other bone of this animal is identified, possibly because of the smaller size of this animal.

The other animals represented at Prabhas Patan are fish, tortoise, crab and molluscan shells. The remains of fish consist of vertebrae, some of them charred. Tortoise is represented by their carapace. Crab is identified by it's mobile and immobile fingers. These crab remains were examined by Dr. K.K. Tiwari of the Zoological Survey of India, Calcutta at the author's request. He has identified two species of crabs and they are *Portunus sanguinolentus* and *Ozius tuberculatus*. Both bivalve and gastropod shells were also identified.

KHANPUR
Animal remains from Khanpur were collected from the sections of a number of pits dug for the purpose of removing earth to the site of a pond under construction near the mound. One hundred and sixty identifiable bones and teeth of animals were found from eight stratified layers. Layers 2 and 3 yielded the maximum number of bones; 58 and 62, respectively. The number of bones collected from other layers is negligible. The animals identified at this site are cattle (*Bos indicus*), buffalo (*Bubalus bubalis*), sheep (*Ovis aries*), goat (*Capra hircus*), both wild and domestic pigs (*Sus scrofa* and *Sus domesticus*), chinkara (*Gazella bennetti*), rhinoceros (*Rhinoceros unicornis*), birds, tortoise, and molluscan shells.

The maximum number of bones at the site belongs to cattle. Almost all the axial and appendicular skeletal parts of these animals are identified. Both young and adult animals are present in the collection. The second most common animals after *Bos indicus* are sheep and goats. Rhinoceros is represented by a single bone, a complete well-preserved humerus.

Chapter V. Interpretation: Economy and Food

BAGOR AND TILWARA
The subsistence economy of the inhabitants of Bagor was mainly dependent on the animals in and around their settlement. Both wild and domestic animals are identified at the site. Altogether 17 species of animals are identified. The maximum number of bones comes from Phase I. Carpals, vertebrae and ribs are not included in the total number of bones. Of the total bones, 78.29% come from Phase I, 19.06% from Phase II and 2.65% from Phase III. Thus it is obvious that there is a steady decline in the role of animals in the economy from Phase I to Phase III.

Economically the most important animals to the inhabitants of Bagor are sheep and goat. They account for more than 60% of the total animal population in each phase. Majority of the bones may belong to sheep because of the metrical differences of the lateral and medial trochleas of the distal articular surface of the metapodia of sheep and goat. The lateral and medial trochleas of sheep are much larger than those of goat (Boessneck 1971).

Complete axial and appendicular skeletons of sheep/goat are identified. The bodies of scapula and pelvis are missing to a larger extent in the collection. Since these bones are the most meat bearing parts of the body the inhabitants must have thoroughly smashed these parts to acquire maximum meat out of them. In this process only the harder portions of the bones are preserved. For the same reason the proximal ends of the majority of the bones are very much damaged or sometime,

not represented at all. Sharp cut marks and charring are detected on 70% of the bones.

When we consider the proportion of the age group of sheep/goat, it is seen that the prehistoric social group of Bagor preferred to butcher sheep/goat between the ages of two to three years. This is evident from their unworn teeth and unfused epiphyses of long bones. Nearly 75% of the teeth belong to animals of this age group. This sort of selection of animals is also indicative of the domestic character of these animals.

Next in importance to sheep/goat are the cattle. The bones and teeth of cattle are very much fractured and also sharp cut marks are noticed on them. Majority of them are slaughtered after the age of three years. The size of cattle at Bagor is slightly larger than the present day domestic cattle. It cannot be said with certainty that these animals were domesticated. Both domestic and wild pigs were identified from all the three phases. Phalanges and metapodials are more numerous than other bones.

Among the other wild animals hunted at Bagor, chital and sambar are significant in the food economy, especially in the first two phases. In Phase III these animals are not represented. Chital is 4.79% in Phase I and 3.93% in Phase II. Most of the axial and appendicular skeletal parts of this animal are noticed at the site. The share of Sambar bones is 4.29% in Phase I and 5.09% in Phase II. The absence of some of the skeletal remains like scapula, humerus and pelvis suggests that because of the large size of this animal the hunters butchered this animal where they were hunted.

The other animals, which contributed to the diet, are buffalo, blackbuck, chinkara, hare, fox, and porcupine. In addition to these animals the inhabitants also exploited the aquatic resources like fish and tortoise to supplement their food supplies. The absence of some of the wild animals in Phase III, is conspicuous. People in this period probably largely depended on agriculture and stock raising. Also the landscape might have changed due to continuous human interference. The abundance of animal remains in Phase I and II suggests that the animal food was more important in the earlier stages of the settlement. The abundance of microliths in these phases also shows that hunting was an important element of the economy. Animal bones were also used for making tools.

The animal remains from Tilwara are not sufficient enough in quantity to draw general conclusions. Among the identified bones, cattle are most common. The other animals represented at the site are sheep and goat.

PRABHAS PATAN

The faunal assemblages of the first three periods of Prabhas Patan have been separately studied. The maximum material comes from Period III. The evidence suggests that the economy of the inhabitants was a combination of hunting and stock-raising. Here the frequency of animals represented have been worked out with the help of both the quantitative methods, the ‘minimum number of individuals’ and the ‘number of identified specimens’

Among the animals identified at Prabhas Patan the most common is the *Bos indicus*. Of the total number of bones 54.69% belong to this animal. A gradual increase in the frequency of *Bos indicus* from Period I to III is noteworthy. These animals were profusely killed to stabilize the food economy of the inhabitants. The slaughtered animals were mostly below three years of age. From the economic point of view *Bos indicus* was the animal, which supplied maximum quantity of meat to the prehistoric people of Prabhas Patan.

Considering the meat value buffalo was the second most important animal in the food economy. A gradual decline in the proportion of buffalo in Periods II and III is noticed. Almost all the bones are equally represented, however teeth are the major part of the collection. These animals were also slaughtered in the same age group as cattle. The inhabitants gave an almost equal importance in domesticating buffalo and cattle in the first period of Prabhas Patan. The reason for the decline in the proportion of buffalo in the succeeding periods is not clear.

Sheep and goat form about 13.33% of the total number of animals slaughtered at the site. These animals are represented by 13.33%, 17.65% and 9.75% in Periods I, II and III, respectively. A rise in the proportion of these animals in Period II and a decline in Period III are noteworthy. These animals were slaughtered after the age of two years.

Pigs played an important role in the economy of the inhabitants, especially in Period III. In frequency this is the second most significant

animal. In the first two periods very young animals were killed. However, in Period III, a selection of this animal after the age of 19 months is noticed.

Among the wild animals chinkara (*Gazella bennetti*) is represented almost equally in all the three periods, though only small number of bones have been identified. Sambar (*Cervus unicolor*) and chital (*Axis axis*) were profusely hunted in the first period at Prabhas Patan. They are less represented in Periods II and III, perhaps because of the deforestation caused by human interference and animal grazing. The inhabitants also hunted porcupine in Periods II and III. The aquatic food resources for the people were fish, tortoise, crab and molluscs.

From the evidence of animal remains, the economy of Prabhas Patan in Period I appears to be different from that in Period II and III. In Period I a mixed economy of hunting and stock-raising was practised. In Periods II and III they relied more on stock-raising than hunting. The preference of young domestic animals in all these periods is noticed. The selection of animals in domestication, is obviously pointing out the economic outlook of the people and also the economic stability.

KHANPUR

The faunal assemblage from Khanpur has been collected from eight layers. The concentration of animal bones is found in layer 2 and 3. Both wild and domestic animals are detected, though majority of them are domestic animals. The prominent domestic animal at Khanpur is cattle followed by buffalo, sheep and goat and pigs, both in wild and domestic forms. Chinkara bones are also found in the collection. The inhabitants exploited maximum aquatic resources available to them. Tortoise and molluscs were the main items in the diet. The occurrence of five varieties of edible shells at the site suggests that the population at Khanpur supplemented their diet with seafood.

ENVIRONMENT

The environment of the past can, to some extent, be reconstructed with the help of the available evidence of wild animals in a particular area. The domestic animals are less useful in this respect because of their adaptability to different environments into which they may be introduced. In the Indian context the animals most reliable for ecological interpretation are elephant, rhinoceros, buffalo, pig, a variety of deer and antelope species. In addition, animals like fish, crab and molluscs also indicate the landscape of the particular region. To interpret the past climate from the evidence of animals one has to study the present distribution of these animals in different climatic zones.

The wild animals represented at Bagor are *Bubalus arnee*, *Sus scrofa*, *Cervus unicolor*, *Axsis axis*, *Antilope cervicapra* and *Gazella bennetti*. At present all these animals except wild buffalo inhabit in the Aravalli hills (Barmer District Gazetteer 1962). Blackbuck is also seen in the open country around Bagor. Majority of these animals live in the open forested area where there is sufficient vegetation for grazing and water. A drastic climatic change cannot be postulated at Bagor, however there is considerable depletion in the landscape. Human interference in the form of deforestation and also excessive grazing by domestic animals may have caused this change. The remains of fresh water fish in the settlement show that fresh water conditions were available in the vicinity of the settlement.

Tilwara has yielded only a few animal remains. Nothing can be said about the ecology of this region based on the limited faunal assemblage. However, the conditions may have been more or less similar to those of Bagor.

The wild animals identified from Prabhas Patan are *Sus scrofa, Cervus duvauceli, Axis axis* and *Gazella bennetti*. At present all these animals are present in the areas surrounding Prabhas Patan (Rajkot District Gazetteer 1965). Economic differences have been noticed in the three cultural periods of Prabhas Patan. The conditions prevailing in Period I for the flourishing of wild life around the site may have been superior to those in the later periods. The prolonged agriculture and grazing of animals may have led to deforestation. Certainly the prehistoric population enjoyed a better environment than the present. However, a severe climatic change cannot be assumed at the site.

The identification of rhinoceros from Khanpur is significant. In the prehistoric times this animal had a wide distribution in Gujarat. This animal has also been reported from other sites in Gujarat like Langhnaj (Clutton-Brock 1965) and Lothal ((Nath 1968). The presence of rhinoceros reveals a moist tropical climate in Gujarat during the post-Pleistocene period.

Chapter VI. Bone Tool Industry of Bagor and Tilwara

A number of bone splinters showing evidence of human activity have been found at Bagor and some at Tilwara. The raw materials used for making tools are the splinters and blanks of bones, metacarpals and rib fragments of bovine and smaller ruminants. A few artefacts made on antler and horn core are also present. The technology involved in the production of tools consists of splitting, cutting, flaking, chipping, grinding, polishing and occasionally fire hardening. These have been employed independently or in a combination in accordance with the nature and purpose for which the tools are planned. At Bagor grinding was used for a majority of the artefacts. The artefacts can be broadly classified into bone needles (two in number), perforators (14), scrapers (4), worked bone and bone blanks (14), cut bones and splinters (11), drilled bones (6). Rodent gnawing is also noticed on a small number of bones.

Chapter VII. Conclusion

The four sites from which the faunal material has been studied in this thesis represent two different types of cultures. Bagor and Tiwara were Mesolithic settlements, at least to begin with, and remained largely so throughout. Prabhas Patan and Khanpur, on the other hand, were advanced Chalcolithic settlements with developed material culture and mixed stone and metal technology.

Bagor is the most extensively excavated Mesolithic site in India. It was also exceptionally rich in faunal material. The excavated debris was sieved by fine mesh sieves, and all the bone material including the tiniest fragment, was carefully sorted out. The most common animals at Bagor were sheep and goat. This situation is unparalleled at any other prehistoric site in India for, at all the other sites, cattle are the predominant animals. However, it must be remembered that we have no clear knowledge of the animal population of Stone Age sites; most of the sites from which faunal remains have been found in any quantity are Chalcolithic sites. Unfortunately the quality of preservation of bones was very poor at the site. The economy was only partially dependent on stock-breeding. The abundance of microliths, especially in Phase I would strongly suggest that hunting was an important aspect of the local economy. A predominantly pastoral economy would hardly need microlithic technology on such a large scale. Nor does the total lack of any other items of material culture except occasional querns and rubbers suggest a totally food producing economy at this early stage.

In Phase II clearly the role of hunting declined as is shown by the decline in the proportion of stone tool industry on the one hand, and appearance of new material traits like pottery, copper tools and stone and bone beads, on the other. Phase III is clearly a much later occupation being separated from Phase II by a considerable time gap. The faunal material from this phase is very poor in quantity and clearly hunting was of secondary importance in this phase. The early inhabitants of Bagor also used animal bones as tools and possibly as ornaments. A number of drilled bone pieces, specially the phalanges of smaller ruminants were probably used as ornaments.

At Prabhas Patan and Khanpur, on the other hand, cattle were the most important animals. The economy at these sites was predominantly based on agriculture, and hunting played only a secondary role. At Prabhas Patan we clearly see a decline in the role of hunting in Period II and III. The preference for animals varies in each period. In Period I we do not see much selection except for *Bos indicus* (cattle). In the later periods a gradual increase in the proportion of this animal and a decline in the proportion of *Bubalus bubalis* (buffalo) is seen. Sheep and goat were domesticated in Period II and pig reached its peak in Period III.

PART II

Archaeozoology or zooarchaeology is now considered as an integral part of the archaeological research in India. This development has taken place over a period of last four decades or so. Now many of the archaeologists are aware of the scientific potential of the faunal remains excavated from archaeological sites. However, there are also people who do not collect the faunal remains. A lot more depends on the interest and knowledge of the persons who are actively engaged in the excavation programmes. The retrieval methods need to be corrected a lot. Both wet and dry sieving need to be done for the deposit to procure micro-organisms, thereby enlarging the scope of ecological studies.
Conducting research in archaeozoology today at the Deccan College is much easier than before since, the laboratory of archaeozoology is well equipped with required facilities, and more than

that, the teachers and students debate in the explanation faunal remains in the cultural context (Thomas and Joglekar 1995). A comprehensive collection of reference skeletons of modern domestic and wild animals, which is a prerequisite for identification of faunal remains from archaeological context, is available at the Deccan College. Therefore, the identification becomes easier and authentic and the species differentiation can be worked out qualitatively and quantitatively (Joglekar *et al*. 1994, Pawankar and Thomas 2001). The introduction of computer analysis of the faunal data is a development, which happened after the submission of this thesis. For this the data has to be collected in a very systematic way according to the computer programme. Every detail of the bone including the taphonomical aspects is dealt with. The advantage here is that the data from different trenches, strata and cultural periods can be compared to get minute details about the occurrence of faunal remains in different contexts (Chandraratne 1999). The horizontal distribution of bones in various trenches and layers if plotted, would provide information regarding various activity areas of the settlement such as animal butchering, cooking, eating, bone tool manufacturing, refuse dumping, etc. It has been possible to work out such specialized areas at Inamgaon, a chalcolithic settlement in the Pune district of Maharashtra (Pawankar 1995). Similarly, an animal butchering floor could be identified at Budihal, a neolithic settlement in the Gulbarga district of Karnataka (Paddayya *et al.* 1995). This is possible only when a very systematic excavation is undertaken, giving thought to all these scientific aspects of the faunal materials.

The metrical analysis of bones is an equally important facet of archaeozoological research for the light it sheds on the biology of prehistoric animals. Measurements of bones can provide information on various aspects of archaeozoology such as: (i) the differentiation of closely linked animal species; (ii) size changes in animals over time; (iii) the identification of sex; (iv) the separation of domestic and wild animals; and (v) the identification of breed. With the help of measurements, it is possible to calculate 'the height at the withers' and thereby be able to compare archaeological animal assemblages from two or more archaeological sites. For example the cattle breeds of some of the chalcolithic sites from Maharashtra such as Inamgaon, Walki (district Pune) and Kaothe (district Dhule) could be compared. The breed at Inamgaon and Walki is more or less similar with the assumption that Inamgaon was a nuclear settlement (Joglekar 1991). Basic statistical tools are now being applied in almost every branch of knowledge including the social sciences. The recent advances in Desk-Top Computer technology make it possible to use a variety of statistical techniques in a systematic and effortless manner. The method comprises both simple ones such as visual separation and the complex multivariate ones. The choice of statistical methods depends on the nature of the variables under investigation. For instance, discrete and derived variables are often examined by non-parametric methods and continuous variables by parametric methods. A dissertation in this aspect has already been produced at the Deccan College (Joglekar 1991).

The study of molluscs or malacology is an important component of archaeozoological studies. In recent years much attention is being drawn to the study of shells from archaeological sites. Shell industries have been reported from a majority of Harappan sites from Gujarat. Molluscs from Kuntasi (district Rajkot) and Shikarpur (district Kachchh) were studied in detail especially, the shell bangle industry. The ethnographic studies conducted on the recent shell working communities in the Vishnupur village in west Bengal has helped to understand the manufacturing techniques of these adornment objects from the archaeological context (Deshpande 1995). Malacology is not only dealing with the subsistence and industry of early populations but also the ecology and seasonality of the site occupied by using the growth ring analysis. The shell procurement strategy is also a significant aspect of archaeozoological studies.

Fish remains from archaeological sites are being studied in detail. Like malacology, this in itself is a specialized branch in archaeozoology dealing with micro-environmental changes during the occupation and also the role of fish in the subsistence economy of a site. In the Indian context not much attention has been given for the study of fish remains. However, in western countries considerable significance is being given for this branch of archaeozoology.

Attention may also be given to the study of insect remains from archaeological sites as they are very good indicators of micro-environmental changes at the site. Recently ethnoarchaeozoology has

assumed greater importance for the interpretation of archaeozoological data from prehistoric and Protohistoric sites. The present day rural methods of animal husbandry and management may reflect to certain extent the methods employed by the ancient populations. The International Council for Archaeozoology (ICAZ) has organized working groups worldwide for all these specialized branches of archaeozoology. And these specialized groups have their own meetings in different parts of the world.

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Prehistoric Settlement Pattern of South-Central Ganga Valley: An Ethnoarchaeological Perspective

Shahida Ansari

Introduction

The thesis entitled- Prehistoric Settlement Pattern of South-Central Ganga Valley: An Ethnoarchaeological Perspective has eight chapters: Introduction, Geographical Setting, Archaeological evidence, Ethnographic Present, Settlement pattern of Simple Communities, Economy, technology and material culture, Implications of ethnography for understanding prehistoric living patterns and lastly Discussion and conclusion. Most part of the thesis is already published elsewhere (Ansari 1999-2000, 2000, 2001, 2002, 2004, 2005) and thus the author here attempts to put forward the gist of the thesis.

Aims and Objective

The main aim of the research was for understanding:

- The settlement pattern and land-use strategies of the prehistoric cultures of South-Central Ganga Valley.
- Ethnographic data collection from three simple communities i.e. Musahars, Kols and Mallahs for ethnoarchaeological understanding.
- To judge the possibility of recovering the ephemeral settlements in the archaeological record.
- Abandoning of settlements on a seasonal basis by the Musahars and Mallahs in relation to the Mesolithic settlements.
- To undertake a locational analysis of the archaeological sites of the region.
- To establish the importance of small game hunting, fishing and fowling among the simple communities.
- To explore the reasons for burying the dead within the habitation area among the simple communities and ancestor worship.
- The use of tools made of organic materials leading to the stabilisation of the prehistoric people of the Ganga plain, which is devoid of stone.
- Studying the importance of storage facilities like storage bins.
- Use of Ethnomedicine among the simple communities as healthcare.

Methodology

There are several methods known in archaeology, which help in identifying and reconstructing the settlement patterns of archaeological cultures. The method adopted here is primarily ethnoarchaeological. Ethnographic fieldwork was carried out systematically and scientifically year round. The settlement pattern research undertaken by the author, is within the context of archaeological and ethnoarchaeological research of the study area. Both the archaeological and ethnographic approaches required a systematic survey of the region in order to locate and record the cultural modifications within the study area. The earlier reported evidence of excavated and explored sites was looked into and pedestrian surface survey across the landscape for evidence of past human activity was carried out. The research focuses on location, type and spatial extent of artefacts, sites (cluster of artefacts) and any visible cultural modifications to the natural landscape of the already explored sites. The methodologies adopted for field survey include large contiguous blocks of land for cultural remains. For ethnographic settlement pattern study, census reports of simple communities and village to village survey among them was carried out in order to locate and record evidence, which would enable better understanding of the past. Thus, a model to draw general implications for early hunter-gatherer behaviour was established. Available literature, exploration and excavation reports were referred to unravel various aspects i.e. settlement, subsistence and migration patterns of the Mesolithic hunter-gatherers and Neolithic-Chalcolithic farmers.

Study Area

The 'south-central Ganga valley' (24° 47'- 26° 10' N.; and 81° 9'- 82° 29' E.) covers mainly the area (10,993 sq km) comprised within the districts of Allahabad and Pratapgarh in Uttar Pradesh. Physically, the area is divided into three distinct parts i.e. the Trans-Ganga or the Gangapar tract, the Doab and the Trans-Yamuna or the Yamunapar tract.

Drainage system: The River Ganga is the main system flowing in west-east direction. The Ganga comprises several subsystems of which the most important are the Yamuna and the Tons (tributaries

are Lapari and Belan). The Ganga receives water from two sets of tributaries; Northern tributaries: Daur, Bisnar, Mansaita, Bairagia, Andaua, and Gondri, and Southern tributaries: Sakara and Bara. Other includes minor systems of the Varuna, Sariha, Gumti and Sai. The area to the north of the Ganga is a flat alluvial plain, with a gentle gradient towards the southeast. It is drained by a number of small seasonal streams and is dotted by numerous horseshoe lakes, which are remnants of the former meanders of the streams. The alluvial plain receives good rainfall and is extremely fertile and densely populated.

Climate: Climate is one of the most important factors governing and controlling the activities of man, natural vegetation, soils etc. In the study area the climate is characterised by a long and hot summer, a fairly pleasant monsoon and a cold season. The winter ordinarily extends from mid-November to February. The season is dry and bracing, although east winds and cloudy weather are prevalent. Winter is followed by summer, which continues till about the middle of June. During summer the hot weather westerly winds prevail and often blow with considerable strength for days at a time. The south-west monsoon then ushers in the rainy season, which lasts till the end of September, the post-monsoon constitutes the months of October and the first half of November.

Rainfall: The rainfall generally decreases from the south-east to the north-west. There are four rainfalls, each of which must be propitious for a good harvest. First, the June rains the former rains as they may also be called. Second the main monsoon, which commences in July and ends at the beginning of October. About 88% of the rainfall is received during the monsoon season. July and August being the month of maximum rainfall. The normal rainfall is 975.4 mm (38. 40") but varies from year to year. Thirdly, the latter or October rains, a moderate rainfall being invaluable for the rice crops, and also moisten the land for the winter ploughings. Otherwise water has to be taken out of the *jhils*. Fourthly, the January-February rains. In most years there are good winter rains.

Flora: A variety of trees are found in the study area. Except in the Trans-Yamuna tract, which has a large area under forests, the number and extent of the planted trees gives a well-wooded appearance consisting of mango (*Mangifera indica* Linn.) and mahua (*Madhuca indica* J.F. Gmel), the latter predominating in the doab, especially in its western part. The guava (*Psidium guajava* Linn.), jamun (*Syzygium cumini* Linn.) Skeels syn. *Eugenia jambolana* Lam.), tamarind (*Tamrindus indica* Linn.), shisham (*Dalbergia latifolia* Roxb., *D. sissoo* Roxb.), gular (*Ficus glomerata* Roxb.), nim (*Azadirachta indica* A. Juss.) and ber (*Zizyphus mauritiana* Lam. syn. *Zizhphus jujuba* Lam., non mill.) and several varieties of grasses are found throughout in the study area.

Fauna: The wild fauna is found in the trans-Yamuna tract and along the banks of the Ganga. But the number and species of wild animals are much greater in the trans-Yamuna tract. The wild fauna found throughout the area are the bear (*Melursus ursinus*), boar (*Sus scrofa*), chinkara or Indian gazelle (*Gazella bennetti*), fox (*Kulpus bengalensis*), hare (*Lepus ruficaudatus*), hyena (*Hyaena hyaena*), Indian black buck (*Anteloppe cervicapra*), Indian porcupine or sahi (*Hystrix leucura*), leopard (*Panthera pardus*), monkeys, nilgai (*Boselaphus tragocamelus*), sambar (*Cervus unicolor*) and tiger (*Panthera tigris*). However Nilgai, wild cattle and pigs are almost entirely confined to the grass or *kachhar* lands on the borders of the Ganga. Snakes are common in the area, the most poisonous being Cobra (*Naja naja* or *Naia tripudians*), Krait (*Bungaraus caeruleus*) and Russell's viper (*Vipera russellii*) which, is viviparous and nocturnal in its habits and is seldom found beyond the hilly country of Yamunapar tract. The Gharial (*Gavialis gangeticus*) and Mugger (*Crocodilus palustris*) are found in the rivers Ganga, Yamuna and Tons. Large varieties of birds are present.

Fish are found in the abundance in rivers, lakes and ponds. The common species being baikri (*Mystus bleekari*), bhakur (*Catla catla* Ham.), bilgara (*Rita rita* Ham.), conch (*Pangesius pangesius* Ham.), gonch (*Bagarius bagarius*), karaunch (*Labeo calbasu*), katanna (*Mystus carvacious*), mangoor (*Clarius batrachus* Linn.), nain (*Cirrihina mrigal* Ham.), pabda (*Callichorous binaculatus*), parhain (*Wallagonia attu*), rohu (*Labeo rohita* Ham.), tengar (*Mystus seenghala* Sykes), tengri (*Gagalia cenis*) and singhi (*Heteropneustus fossilis* Bl.). The Common European Carp (*Cyprinus carpio* Linn.), a new species, was introduced in the district in 1959. About 43 species of fish belonging to 11 different families are found in the river Ganga (Ansari 2002). The class of aquatic mammals is represented by its lone member Gangetic dolphin

(*Platanista gangetic*) known as *Susa*, *Sons,* or *Swis* (Bilgrami 1991: 92).

The climatic conditions during the prehistoric times were similar but better than the present and the vegetation cover and fauna were much richer. This is known through the examination of soil samples collected from the vicinity of Mahadaha and horseshoe lake at Nevari near Sarai Nahar Rai which, suggests a grassland vegetation. Pollen analysis in the Belan and Ganga valleys shows dominance of Gramineae, which might have included edible species of grasses and cereals (Gupta 1976: 109-199).

History of Archaeological Researches in the Study Area

The first finds of prehistoric tools, namely Neolithic celts or hatchets in India were made in 1860 by H.P. Le Mesurier (1861) from the Tons, valley of hilly tract region, south of Allahabad in Uttar Pradesh. Later W. Theobald (1862) collected Neolithic celts from Banda in Bundelkhand. In 1867-68, A.C.L. Carlleyle discovered the earliest microliths from caves and rock shelters in the Kaimur Range, in Mirzapur district of Uttar Pradesh. In 1881 he discovered microliths and human skeletal remains from the floor of rock shelter, at Morhana Pahar in Mirzapur (Cook and Martingell 1994). Carlleyle's work was never adequately published and is known only from secondary sources like that of J. A. Brown (1889), V. A. Smith (1906) and B. Allchin (1958).

Discoveries of Neolithic celts in Banda district were made in the 1870's and 1880's by J. Cockburn (1879) and H. Rivett Carnac (1882, 1883, 1884). J. Cockburn (1883a, 1883b, 1888, 1894) also discovered the first Palaeolithic artefacts from the Singrauli basin in Balia district and Kon ravines in Mirzapur district of Uttar Pradesh. In the course of his explorations near Gaharwargaon in the Singrauli basin he also obtained fossil cattle bones. After this no discoveries were made for two decades. C.A. Silberrad (1907) located some painted rock-shelters in Banda district. In 1911-12 Sir John Marshall (1911-12) found a Neolithic celt in the historical context at Bhita in Allahabad district. In 1932 M. Ghosh (1932) examined painted rock-shelters at Lekhahia, Kohbar and Mahadaria in Mirzapur district.

In 1949 V.D. Krishnaswami and K.V. Soundara Rajan (1951) carried out an exploration in the Singrauli basin and located several Palaeolithic and Mesolithic sites. In 1955 G.R. Sharma (*IAR* 1955-56: 4) located the first Palaeolithic site in Banda district. The discovery of Morhana Pahar by B. Allchin in 1958 (1958: 153-155) led to a systematic investigation of the region by archaeologists from the Allahabad University. During 1959 to 1963 R.K. Varma (1964) explored 33 open-air Mesolithic sites and 27 rock shelters in Mirzapur district.

In Banda district Neolithic polished stone axes and hammer stones were collected by P.C. Pant (*IAR* 1962-63: 37-38). In 1963-64 V.D. Misra excavated Mesolithic open-air settlements and rock-shelters at Lekhahia in Mirzapur. The excavation confirmed the development sequence of microlithic industries as similar to those obtained at Morhana Pahar and Baghai Khor (Misra 1977: 53-57). P.C. Pant (1965: 81) conducted extensive exploration in Varanasi, Mirzapur, Banda, Hamirpur and Jhansi districts of southern Uttar Pradesh and brought to light 24 microlithic sites.

The site of Chopani-Mando furnished further evidence of development in the microlithic industry of the Vindhyan region. It was excavated horizontally and yielded ten layers divisible into three cultural phases i.e. Epi-Palaeolithic, Early Mesolithic and Late Mesolithic (Sharma *et al.* 1980: 33-70).

In 1969, Neolithic celts were recovered from Chorbana and Chaukatha (Meja tahsil), Jamua (on the Lapari) and Taradah (on the Belan) in Allahabad district (*IAR* 1969-70). Significant prehistoric research in the region took place from 1970 onwards. In 1973 G.R. Sharma (1973a: 129-146, 1973b: 106-110) published reports of his explorations in the Vindhyas and the Ganga Valley. He and his colleagues (Sharma *et al.* 1980) explored Allahabad, Pratapgarh, Sultanpur, Jaunpur and Varanasi districts and brought to light 198 Mesolithic sites. Prof. V.D. Misra (1977: 29-67) highlighted the spatial distribution of archaeological sites, their sequence and chronology. R. Tewari (1983) reported rock-shelters and microliths in the Vindhyan region.

The two important sites of Tokwa and Jhusi are not incorporated in the thesis for ethnoarchaeological study, as they were ongoing at the time of submission of the thesis. The site of Tokwa (24° 54' 20" N; 82° 16' 45" E) is situated on the confluence of the Belan and Adwa rivers in Lalganj

sub-division of Mirzapur District of Uttar Pradesh. The site was excavated in 2000 by J.N. Pal and M.C. Gupta under the guidance of V.D. Misra of the Department of Ancient History, Culture and Archaeology, University of Allahabad. It covers an area of 27,579 sq m. The occupational deposit, measuring 4 m, is divisible into 16 layers. It has revealed a cultural sequence of Neolithic, Chalcolithic and Iron Age. There was a temporal gap between the Neolithic and Chalcolithic cultures as they exhibit different traits in ceramic tradition. While Neolithic pottery is handmade the Chalcolithic is wheel thrown. There is also difference in preparation of clay in manufacturing the pots. The characteristic ceramic tradition of the Neolithic, namely handmade cord impressed ware is not represented in the Chalcolithic horizon. Moreover the uppermost Neolithic horizon has yielded small potsherds, which are interpreted by the excavators as indicating that the site remained unoccupied for a considerable length of time between its desertion by the Neolithic people and reoccupation by the newly arrived Chalcolithic people (Misra *et al.* 2001: 70).

Another important site of Jhusi (25° 26’ 10” N; 81° 54’ 30” E) is located on the confluence of the Ganga and the Yamuna in Allahabad District. It was excavated for four seasons (1995, 1998, 1999, and 2002) by V.D. Misra and his colleagues of the Allahabad University. A total of 16.5 m cultural deposit containing evidence of seven cultural periods, namely Mesolithic, Neolithic, Chalcolithic-Early Iron Age, NBP, Sunga-Kushana, Gupta and Early Medieval was encountered. The Mesolithic period is represented by geometric microliths (Misra *et al.* 1996, 1999, 2000 and 2003). Phase A of the Chalcolithic-Early Iron Age (previously called Pre-NBP), which is devoid of iron objects, has given following calibrated radiocarbon dates 1597 BC, 1400 BC, 966 BC and 799 BC. Phase B, marked by the appearance of iron objects has given the following dates 1107 BC, 897 BC, 844 BC, and 789 BC.

The discoveries provided considerable evidence for a proper study of the Mesolithic, Neolithic and Chalcolithic way of life in the study area. The sites selected for ethnoarchaeological interpretation are:

- The Mesolithic sites of Sarai Nahar Rai, Mahadaha and Damdama in the Ganga Valley and Chopani-Mando in the Belan Valley.
- The Neolithic sites of Mahagara, Koldihwa and Panchoh in the Belan Valley and,
- The Chalcolithic sites of Koldihwa and Khajuri in the Belan Valley.

Archaeological Evidence

In India the Mesolithic period is characterised by a well-developed microlithic technology. Wherever found in a stratified context, the Mesolithic period is succeeded by the Upper Palaeolithic period and preceded by the Neolithic and Chalcolithic periods in different parts of India (Misra 1989: 24-26). Southern Uttar Pradesh was occupied since the Palaeolithic times. Abundant cultural remains of the Palaeolithic, Mesolithic, Neolithic, Chalcolithic and Iron Ages have been found in the study area.

Belan Valley and Archaeological Sites: The various formations constituting the sections on the Belan, with an average height of 18 m and maximum of 21 m show marked climatic oscillations in the Pleistocene age and in the beginning of the Holocene. The Pleistocene formations of the Belan depict the earliest human existed right from the Lower Palaeolithic period to the Neolithic period (Pal 1990: 4; Varma and Pal 1997: 95).

About 40 (12 factory sites) Lower Palaeolithic sites have been reported from the Belan valley. Majority of the tools have been collected either from the beds of the Belan and its tributaries or from factory sites. The assemblage constitutes cores, flakes and finished tools: hand axes, cleavers, scrapers and the pebble tool (Misra 1977: 37).

About 60 (24 factory sites) Middle Palaeolithic sites have been reported from the Belan valley. The factory sites are located on the slopes or foothills of the Panna Ranges overlooking the Belan valley or adjacent to them. Fine-grained quartzite of blackish, brownish and greenish colour was the main raw material used (Misra 1977: 43-44).

The earliest occurrences of the Upper Palaeolithic tools in the Belan section are recorded from the yellowish silt, the deposit underlying the gravel III, where these occur along with the Middle Palaeolithic tools. The Belan section indicates a long time-span for the Upper Palaeolithic industry in the region, undergoing many morphological and technological changes from time to time. About 40 (10 factory sites) sites have been located in the Belan valley (Misra 1977: 48-49). These sites are located on the foot of the hillocks where the hills meet the low ground and at the toe of the low

outlying hillocks, slightly away from the present bed of the river.

After the Upper Palaeolithic period there was a sharp change in the system of the Vindhyan rivers, and the Belan started to deepen its channel and build its most recent terrace which rests on the Cemented Gravel III. The blackish and brownish clay deposits in the Belan valley are associated with tools of the transitional stage between the Upper Palaeolithic and Mesolithic, i.e. Epi-Palaeolithic phases. Parallel changes also affected the Ganga, which formed the most recent deposit of its plain - the yellowish sand capping. The Ganga gradually withdrew to its present course, leaving behind old meanders in the form of horseshoe lakes.

The rich vegetation and fauna of the Belan valley attracted prehistoric inhabitants who moved from the Vindhyas to the fertile new land. The presence of wild rich vegetation and rocks like quartzite, quartz, chert, chalcedony, agate, carnelian, and jasper in the nearby Kaimur hills offered prehistoric inhabitants raw material for making tools and to exploit rich supply of wild plants and animal foods.

The only excavated Mesolithic site in the Belan valley is the site of Chopani-Mando (24° 55' 30" N; 82° 4' 45" E) a fairly extensive open-air settlement measuring 15,000 sq m. In 1967 B.B. Misra and V.D. Misra conducted a small-scale excavation under the supervision of G.R. Sharma (*IAR* 1966-67: 38). Later during 1977-1979 B.B. Misra, R. Singh and B.G. Pandey carried out large-scale horizontal excavation under the supervision of G.R. Sharma (*IAR* 1977-78: 51-52; *IAR* 1978-79: 56-57; Sharma *et al.* 1980: 33-76). The site revealed 1.55 m thick habitational deposit comprising of 10 layers, divisible into three cultural phases comprising of circular structures, development in the microlithic industry of the Vindhyan region, lithic artefacts, stone objects, bone objects, pottery, stone beads, plant and faunal remains.

The explored Neolithic sites in the study area are 26 in number. These Neolithic sites were concentrated on either sides of the Belan valley and its tributaries like Seoti, Tundiari and Gorma all originating from the Kaimur/ Upper Rewa ranges in South. The Neolithic sites excavated are the site of Mahagara (24° 54' 50" N; 82° 3' 20" E) covering an area of 8000 sq m. D. Mandal, and J.N. Pal discovered the site in 1976, and excavated it from 1976-79 under the supervision of G.R. Sharma, R.K. Varma and V.D. Misra (*IAR* 1975-76: 47, 1976-77, 1977-78: 52-54, 1978-79: 57; Sharma *et al.* 1980: 133-200). The single culture site revealed habitation deposit of 2.60 m comprising of 17 layers divisible into six structural phases, on the basis of floors, postholes and pits. The other finds are cattle pen, lithic artefacts, pottery, food producing equipment, earthen discs, beads, shell-pendants, plant and faunal remains.

Located just opposite Mahagara, is the mound of Koldihwa (24° 54' 30" N; 82° 2' 0" E). A number of Neolithic celts, ceramic assemblage, microliths, bone tools, animal bones and beads were found during explorations (*IAR* 1962-63: 37, 1970-71: 36-37) by B.B. Misra. The excavations were carried out under the supervision of G.R. Sharma, R.K. Varma and V.D. Misra, and B.B. Misra and R. Singh excavated the site in 1972-73 and 1973-74. Subsequently D. Mandal and J.N. Pal also excavated it in 1974-75 and 1975-76 (*IAR* 1973-74: 26-27, 1975-76: 45-47; Pal 1986: 39-40; Sharma *et al.* 1980: 135-136). Excavation revealed 1.90 m thick habitational deposit (eastern mound) divisible into three cultural deposit i.e. Neolithic, Chalcolithic and Iron Age. The Neolithic level though disturbed give evidence of burnt clay pieces with wattle and daub impressions, pottery, lithic artefacts, food processing stone objects, plant and faunal remains. These Neolithic sites (Mahagara and Koldihwa) are at a distance of only 3 km south-east of Chopani-Mando.

The site of Panchoh (24° 55' 45" N; 82° 2' 30" E) is situated 2.5 km north-west of the Koldihwa on the right bank of the Belan. The site was discovered in 1971 (*IAR* 1970-71: 36) and excavated by B.B. Misra in 1975-76 under the supervision of G.R. Sharma. The single culture site has 60 cm thick deposit with three layers. The site revealed circular floors, lithic artefacts, Neoliths, pottery, food processing stone objects and beads.

A total of 16 Chalcolithic sites have been reported from Belan valley. There is no stratigraphical evidence to show that there was contact of the Neolithic and Chalcolithic cultures. However, the cultural traditions of the Neolithic traits survived to the Chalcolithic period, which throw light on the evolution of Chalcolithic culture in the study area (Pal 1990: 204). The Chalcolithic people in

southern Uttar Pradesh built Megalithic monuments (Pal 1990: 202; Misra and Misra 1977: 319; Pal 1995: 13, 16). These sites are located on the northern slopes of the Vindhyas and the Ganga-Yamuna alluvium as well as on the banks of the rivers and nalas at the foot of the Kaimur hills. The Megaliths typologically are divisible into three categories: Cairn-circle, Cist and Cist within cairn. The morphological distribution of the megaliths indicates that the dominant type is cist in Allahabad district. The Chalcolithic site of Koldihwa on the western mound revealed 1 m thick habitational deposit comprising of seven layers, 2 to 7 being Chalcolithic (Pal 1986: 57-59; *IAR* 1971-72: 44). The evidences at the site are kitchen middens, structural remains, one mouthed *chulha* and pottery.

The site of Khajuri (24° 54' 30" N; 82° 2' 30" E) is located on the right bank of the river Belan near its junction with Khajuri nala about 80 km from Allahabad and to its eastern and south-easterly direction. The site was reported for the first time in 1962-63 (*IAR* 1962-63: 32). B.B. Misra with assistance of K. Thakur excavated the site during 1985-86. (*IAR* 1985-86: 75-77). The site measuring 5.5 hectares (250 m from north to south and 220 m from east to west) is irregular, oblong in shape. The site revealed 2.20 m thick habitation deposit comprising of 10 layers, divisible into two cultural periods (layer 5-10 being Chalcolithic). The evidences at the site are represented with structural features, lithic artefacts, pottery and faunal remains.

Ganga Valley and the Archaeological sites: The sandy soil of the Ganga-section is implementiferous throughout the deposit; it was inferred that the Stone Age hunters started coming to the Ganga valley at a time when this layer was in process of formation and they continued to come throughout the formation. In its vast plain, the Ganga flowed creating meanders in the featureless soft alluvium. The nature of these lakes represents the stages of withdrawal of the Ganga from 55 km north to its present course. Some of these isolated meanders are still surviving and form a perennial source of water. The ancient meanders of the river were left isolated and were converted into horseshoe lakes before the end of the Pleistocene (Sharma 1975: 5, 8-9; Misra 1977: 59). The prehistoric people inhabited these meanders. They arrived in the Ganga valley from the Vindhyan region. Their presence is recorded at five Epi-Palaeolithic sites (*IAR* 1978-79: 23; Sharma *et al.* 1980: 33, 123). These sites provide the earliest evidence of human colonization in the Ganga Valley. They can be termed as small campsites. The tools of Epi-Palaeolithic period are made of chert. The tools are bigger in size than those of the succeeding Mesolithic period. The main tool types are blunted back blades, lunates points, and scrapers.

The human colonization intensified in the Holocene as is evident from the discovery of nearly 183 Mesolithic sites (177 in Pratapgarh district and 7 in Allahabad district). Of these, 164 sites belong to the Early Mesolithic phase (Non-Geometric, Phase II A) and 20 to the Late Mesolithic phase (Geometric, Phase IIB). The Mesolithic settlement is represented by four characteristic locations; along rivulets and their seasonal tributaries, in close association to horseshoe lakes, rock shelters, and away from rivers and lakes. The sites are mainly found on the topmost formation of loose and sandy earth of *bhangar* and the *khadar* is devoid of sites. Location of settlements along rivulets and lakes is probably related to the availability of water and aquatic resources. The presence of dense forest in inland areas might be another probable reason. The settlements are located generally on barren land (*usar*) and are away from the reach of annual floods. The settlements are smaller in size and measure between 4.5 sq m to 5 sq m in area. There are also a few larger sites like Sarai Nahar Rai (1800 sq m), Mahadaha (8000 sq m) and Damdama (8750 sq m). The average spacing between two sites is between 5 and 10 km in Pratapgarh district and more in Allahabad District (Pandey 1985: 132).

The site of Sarai Nahar Rai (25° 48' 0" N; 81° 50' 0" E) was first reported by Dr. K.C. Ojha, Director of U.P. State Archaeology (*IAR* 1968-69: 33-35) subsequently the site was excavated by Allahabad University, for two seasons, 1971-72 and 1972-1973, under the supervision of G.R. Sharma, with assistance from R.K. Varma, V.D. Misra and D. Mandal (*IAR* 1969-70: 43-44; Sharma 1973: 129-146, 1975: 1-20; Sharma *et al.* 1980: 79). The site revealed good evidence of short duration habitation in the form of structures, 8 hearths, 12 graves (15 skeletons), post-holes, microliths, stone implements, bone and antler tools, plant and faunal evidence.

The first season (1977-78) excavation at Mahadaha (25° 29' 2" N; 82° 11' 30" E) was conducted by V. D. Misra, D. Mandal and J.N. Pal under the supervision of G.R. Sharma (*IAR* 1977-78: 58-59; Sharma *et al.* 1980: 77-131). The excavation revealed a single culture tradition of 60 cm thick habitation comprising 4 layers. It revealed 15 graves containing 17 individuals and 8 hearths of four different phases. In 1978-79, an area to the west of the previously excavated area, was exposed. The excavation was conducted under the direction of J.N. Pal and under the general supervision of G.R. Sharma (*IAR* 1979-80: 59-60). The excavation was confined only to the last phase of the settlement. Within the area were found 27 oval or circular hearths. Besides hearths 13 graves with 11 individuals were exposed (*IAR* 1979-80: 60; Pal 1985: 28-37).

At Damdama (26° 10' N; 82° 10' 36" E) an excavation spanning five-seasons (1982-83 to 1986-87) was carried out by R.K. Varma, V.D. Misra, J.N. Pandey and J.N. Pal from 1982-84. The excavation from 1985-87 was carried under the direction of V.D. Misra, J.N. Pandey, J.N. Pal and assisted by D.K. Shukla, M.C. Gupta, H.N. Kar, L.K. Tewari, V.N. Rai, Rajendra Prasad, V.K. Khatri and Sanjay Kumar (*IAR* 1982-83: 99-100, 1983-84: 90-92, 1985-86:83-84, 1986-87: 83-84; Varma *et al.* 1985: 45-65). Excavation revealed a continuous and uninterrupted 1.50 m thick habitation deposit, divisible into 10 layers. The site revealed floors, 41 graves, microliths, stone objects, 92 bone arrow heads, 13 utilized horns, bone ornaments, plant and animal remains.

In recent past Neolithic horizon findings at the site of Jhusi, Allahabad demands a fresh for understanding the past culture in relation with the location of the site. Similarly twenty-one Chalcolithic sites have been explored but none of them is excavated.

Ethnographic Present

Although listings of communities are found in historical literature and inscriptions, they are short and their content is local or regional in nature. It was in 1806 that the communities of the provinces were listed in detail. Subsequently, the census operations from 1881 to 1941 generated the first comprehensive data set for British India and the princely states, on what was described by the census as 'Caste, Tribe and Races', and their classification.

The Musahar, Kols and Mallahs come under Scheduled Castes in the State of Uttar Pradesh.

Musahars: The name Musahar is derived from a curious association with field rats. Presently, they are mainly distributed in the districts of central and eastern Uttar Pradesh. The Musahars of Uttar Pradesh are called Banmanus, Banraja or Gonr. According to H.H Risley (1891), 'Musahars are an offshoot of the Bhuiya tribe of Chota Nagpur'. According to J.C. Nesfield (1888: 2) the term Musahar (*masa* meaning flesh; *hera* meaning seeker) signifies flesh seeker or hunter, and another view holds that Musahar (*musa* + *har*) means rat-taker or rat-eater. H.H Risley was inclined to accept the second view. In the study region the natives pronounce them as Mushera, Musahar or Musaha. William Crooke (1896, Vol. IV: 12) called Musahar a Dravidian jungle tribe living in the Eastern districts of the Provinces. He also recorded their population in the Allahabad district (361) and in Pratapgarh district (242) in the year 1891 (Crooke1896, Vol. IV: 12, 37). J.C. Nesfield while quoting the origin of the tribe mentions them as 'Banmanush' or "man of the forest"; Deosiya, from their great ancestor Deosi; Banraj or "king of the forest"; Maskhan or "eater of flesh" (Nesfield 1888: 3; Crooke 1896, Vol. IV: 13).

Their traditional economic activity is collection and sale of medicinal roots and herbs, wild honey, preparation and sale of leaf plates, collection and sale of gum, live lizard (*goh*), lighting of brick kilns, field labourers, rearing silk worm and carrying palanquins (Crooke1896, Vol. IV: 12-13, 36-37). But nowadays, the Musahars are working as palanquin bearers, labourers in brick kilns, and agricultural labourers. Some are involved in piggery (Singh 1993: 969-970). Soran Singh (1987: 33) defines the Musahars as a criminal tribe (now absorbed in Hinduism), rat catchers, palanquin bearers, field labourers, and cultivators. He also described them as being a servile caste.

Kols: The Kols are one of the Kolarian groups of races (i.e. those tribes who inhabit hill tracts extending from the east to west along middle India, and who speak, or are known to have formerly spoken, the various dialects or forms of language which have been grouped under the name 'Kolarian') like the Mundas, Hos, Santhals, Bhumijs, Tamarias and Juangs. The Kol lent their name to the language family known as Kolarian, better known as the Mundari or the Austro-Asiatic

language group. The Kol belong to the Proto-Australoid ethnic stratum (Singh 1996: 1763). According to Hadden (1924), they can be placed among the Pre-Dravidian group of races. The Kols are the most widespread of the simple communities of Uttar Pradesh. They are found in Varanasi, Mirzapur, Allahabad and Banda districts, which form the Southern tribal belt of Uttar Pradesh. The Kols along with other Mundari tribes constitute the largest group of simple communities in India. The Kols of Uttar Pradesh constitute nearly 22% of the total tribal population of the state. They are included among scheduled tribes in all the states in India except in Uttar Pradesh where they are listed among the scheduled castes. The largest concentration of Kols in India is in Madhya Pradesh and Uttar Pradesh.

The Kols are, as a matter of fact, an offshoot of the Mundas of Chota Nagpur (Russell and Hiralal 1916: 500). This term is not at all known or ascribed to the tribe in Uttar Pradesh. According to Russell and Hiralal (1916: 501) the word Kol is probably derived from the Mundari '*Ho*', '*Hore*' or '*Horo*' meaning 'man', which in course of time, assumed different forms i.e. *Koro, Kolo,* or *Kol* (Dalton 1871: 178; Nesfield 1888: 5; Crooke 1896, Vol. III: 294). As for the genesis of the word Kol, it is ascribed to many etymological sources, for instance to *Korar*, a name given to the Mundas by the Kharias of Chota Nagpur, which closely approaches the word Kol. *Kola* in Sanskrit means 'a hog' and some authorities maintain that it is simply a term of contempt applied by the Aryans to the original inhabitants of the country (Nesfield 1888: 5). According to Herr Jellinghause (Risley 1891: 101), the term means a 'pig killer'. The word Munda, Sir H. Risley states, is the common term employed by the Kols for the headman of a village, and has come into general use as an honorific title (Russell and Hiralal 1916: 502).

Their traditional occupation is collection and sale of fuel wood and leaves from forests and as agricultural labourers; the more primitive Kols practice the slash and burn of cultivation i.e. *dahya* (Crooke1896, Vol. III: 294, 315-316). The Kols are a landless community and at present their present occupation ranges from mine workers, rickshaw pullers, unskilled labourers to cultivators (Singh 1993: 744). The Kols are also water-carriers and fishermen.

Mallah: The word Mallah is the generic term used for a group of people whose occupation revolves around boating and fishing. In the study area Mallahs are also known as Nishad, Kewat, Dhimar, Karbak, Kachhwaha, Malso, Mallahi or Jalak. According to Russell and Hirallal (1916: 171-72) the word Mallah is an Arabic word meaning 'salt' or according to another derivation, 'to move its wings as a bird'. The term is no doubt purely occupational, and, being of Arabic origin, must have been introduced in comparatively recent times.

Water transport and fishing are their traditional occupations. Those communities that have abandoned fishing have become generally speaking, separate sub castes, which regard themselves as superior in position to those who remain loyal to the net. Basically fishing is the primary occupation of the Mallahs while agriculture is considered a secondary one. The Mallahs sell fish in the market but nowadays some of them are engaged in rickshaw pulling or as agriculture labourers and daily-wage labourers in factories (Singh 1993: 899; Singh 1998: 2166).

Ethnographic Documentation of Settlement Pattern

The settlement pattern research undertaken is within the context of archaeological and ethnoarchaeological research of the study area. The method adopted here is to understand the settlement, and possible migration patterns of the Mesolithic hunter-gatherers and Neolithic-Chalcolithic farmers through the settlement patterns studies of the Musahars, Kols and Mallahs. For understanding the settlement according to the degree of permanence, studies by Muller-Wille (*cited in* Butzer 1972: 404) were referred to. He recognises the following settlement types based on duration of site occupation, i.e.,

- *Ephemeral* settlements of a few days duration
- *Temporary* settlements of several weeks duration
- *Seasonal* settlements of some months duration
- *Semi permanent* settlements of some years duration
- *Permanent* settlements lasting for several generations

The general terms like farmsteads, hamlets and villages are commonly used here to describe the settlement types of the simple communities. The term farmstead characterises the grouping of agricultural buildings forming the focus of anindividual farm enterprise. Normally there is a

dwelling house or more than one house, animal shed, storage shed for fodder and crops, working area, yards, pens and open work-spaces, all delimited by fences, walls and access ways. The term **hamlet** is an area for settlement comprising a cluster of 6-8 farmsteads. The hamlets cannot easily be distinguished from the smallest villages and are identified by three characteristics: they are relatively small, they are frequently administratively linked with other places upon which they are dependent, and they normally contain a limited range of services than villages. The term **village** is a clustered assembly of dwelling places.

The physical factors largely mould settlement pattern in the study area. In the Ganga-Yamuna doab, high fertility of soil i.e. *bhangar* lands, adequate irrigational facilities, and well-developed means of transport have given rise to almost uniform distribution of settlements located above flood levels. In the Yamunapar tract, where the land is often broken, the distributional pattern of villages is governed by the availability of the level nature of the plain. The ravines of Sai and other rivers are devoid of settlements as are *usar* tracts, and only on their edges with better lands have villages sprung up with large and medium compact and semi-compact settlements (Singh 1971: 143).

Every village has small hamlets, situated at a distance of hardly a few hundred metres. They are usually named after the main village and are basically small-sized satellite settlements. The tenants and agricultural labourers who belong, to the lower castes usually inhabit these settlements.

Settlement in the study area takes four main types and a number of minor forms. They vary from each other in a number of ways, i.e. in size and composition of social groups, size and layout, structures size and form and construction materials. The four main types are Temporary fishing settlements, Seasonal summer agriculture settlements, Semi-permanent settlements and Year-round permanent settlements. The settlement types vary in distribution pattern and locations in the alluvial plains and in the Vindhyan region.

a. Temporary fishing settlements: These settlements are found near riverbanks, lakes and ponds. The topographic location for temporary settlements is near natural glades along or close to a stream, and near a water source in the forest. These settlements are seasonal, specialized, mobile and shift according to the availability of resources. Thus, the suitability of the location is a strong motive for the choice. If the site is unsatisfactory the group can move on with little trouble. The distance between two settlements depends largely on the size of social groups and a large distance is maintained between them depending on economic resources. In the Vindhyan region these settlements are located on small hills near a water source. These settlements are constructed to serve a smaller purpose than the permanent settlements and are different in appearance. The structures are huts and are linear in morphology. The huts are made of low mud walls, thatched roof supported by wooden centre posts and cross beams. They are meant mainly for shelter and activities. Occasionally the occupants do a small amount of gardening behind the huts. Sometimes male members must return to their villages periodically to irrigate fields or attend to other businesses at home. These temporary settlements are abandoned and reoccupied from time to time. Fishing in rivers and tanks begins in November and continues till May or June. In the first week of the rains, when the river starts flooding, larger quantities of fish are caught in one to two weeks than in several weeks in the summer and winter seasons.

b. Seasonal summer settlements: In plains these settlements are found near agricultural fields and sandy stretches of receded Ganga waters, as at Jhusi near Allahabad while in the Vindhyan region settlements are found on hilltops for agriculture near water sources like the river Belan and its tributaries. These settlements are at lower heights than the permanent settlements. The distance between two temporary settlements is greater and largely depends on the economic resources and the type of land. The speciality of these settlements is that they are abandoned seasonally and are reoccupied in the next season. During the summer, availability of water is paramount. Hence these settlements are mainly near water sources.

c. Semi-permanent settlements: These settlements are specifically seen among the Musahars and Kols in the plains. The houses are linear and semi circular in morphology and contains 5 to 12 families. The settlement is based near a forest and a water source, just a few kilometres away from the main village. Structures are made of wattle and daub and mud. There are also shelters for domesticated animals. This type of

settlement is mainly based on their traditional subsistence of hunting and gathering, fishing, fowling and partially agriculture.

d. Year round settlements: In plains these settlements are more uniformly distributed than in the Vindhyan region. Here the settlements are stable, clustered and evenly distributed and the space between two villages is restricted only from 1.5 to 2 km. In the Vindhyan region the settlements are dispersed and are situated at greater distances (3 to 5 km) from each other because of the hilly terrain. They are generally found on hills. In the year round settlements, half of the structures are used for human shelter. The others are for animal shelter (goats, pig, hen and cattle) and agricultural equipment. Structures for human shelter are mostly made of mud, mud bricks and stone. There are courtyards, vegetable gardens and threshing floors. For domesticated animals there are straw roofed pens, stone or stone slab shelters. Every settlement has a cremation and a burial ground. If the settlements are situated on the riverside, water from the river itself is utilised for cleaning and drinking otherwise wells are dug in the village for water.

Community-wise settlement types: The simple communities live in both natural and artificial shelters. Topographic locations are carefully chosen, with security and economic development as the dominant motive. It is observed that the Musahars, Kols and Mallahs have varied types of settlement styles. Shelters for human occupation, animals, and storage are mainly designed according to the severity of climate. The climate in the study area is characterised by cold winters, hot summers, with high winds and hot winds (*loo*) and rains. The settlement types were dealt with community-wise to understand their total activity area, hearth area, morphology and the disposal of dead. As a detailed study is well documented (Ansari 2001a, 2005) here the author is only mentioning the types of settlement of the simple communities;

The Musahar Settlements

- Settlement Type I (Seasonal Open Air Settlement) (figs. 1, 2)
- Settlement Type II (Seasonal Summer Settlement) (fig. 3)
- Settlement Type III (Semi-Permanent Settlement) (fig. 4)
- Settlement Type IV (Year Round Permanent Settlement, Small Village)

The Kol Settlements

- Settlement Type I (Seasonal Settlement)
- Settlement Type II (Semi-Permanent Settlement, Hamlet)
- Settlement Type III (Year Round Permanent Settlement, Small Village)

The Mallah Settlements

- Settlement I (Temporary Fishing Settlement)
- Settlement Type II a (Seasonal Agricultural Settlement, Hill Top) (figs. 5, 6)
- Settlement Type II b (Seasonal Agricultural Settlement, Receding Ganga)
- Settlement Type III (Permanent Settlement)

Degree of Permanence and Impermanence of the Settlements

Most of the permanent settlements in the plains are occupied throughout the year by most of their inhabitants. Seasonal summer settlements are occupied from May to August, depending on the seasonal conditions suitable for agriculture. Temporary settlements are occupied during the rains (August and September) and in summer seasons.

The occupational stability varies according to settlement type and depending on the location and size, which are interrelated. Among the Musahars settlements, random fluctuations in population have their greatest effect on small seasonal open-air settlements and seasonal settlements resulting in less stability as compared to semi permanent and permanent settlements.

The seasonal agricultural settlements- farmsteads among the Kols and Mallahs come and go frequently. Seasonal settlements are sensitive to the economic and climatic conditions. Abandonment in a bad agricultural year and reoccupation in good years shows the flexible nature of these settlements. They generally occupy the area near the hut previously occupied or repair them. But at times they do not reside in the same place and construct huts in different places. Therefore ploughing of the land for agriculture destroys most of the traces and evidence of the earlier settlement.

The temporary fishing settlements are more occupational and specialised. The speciality of these settlements is that they are mobile according to the actual natural output of the area. The temporary settlements are not far away from the main permanent settlements and constant contact between them is maintained.

It was observed that huts of circular or rectangular types are prevalent among all types of settlements. But it is the material used for constructing huts that helps in differentiating between each settlement type. Circular and rectangular thatched huts are the most common type in temporary, seasonal and semi permanent settlements. Thatched wattle and daub huts are commonly seen among the seasonal and semi permanent settlements. Thatched rectangular mud houses are common in semi permanent and permanent settlements. Tiled rectangular mud and stone houses and brick houses are most common in permanent settlements.

In temporary and seasonal settlements the activity areas are recognisable as both the use and discard locations are similar. In semi permanent settlement they throw discarded materials some distance away from the living space. Hence, there is a partial link between use and discard location. In permanent settlement there is no link between the use and discard location and discarded materials are mainly found at a certain place. It was noticed that the longer the stay the higher the yields of trash at any type of settlement.

Structure: The construction of Mud houses among the Musahars, Kols and Mallahs are for protection from climatic severities and for storage of belongings. Methods of construction of houses depend very much upon the economic health of the house owner and the climate. Both men and women participate in house construction, but men do most of the actual labour. Friends and relatives also participate in a form of a community act and are helped in return when constructing their own houses. Construction is done seasonally. Mud brick walls are made best during summer, when the people are free from agricultural activity. Huts are built mostly in winter and occasionally in summer. They are repaired before and after the rains. Lime plaster is applied on the inner and outer walls to insulate the rooms. For obtaining better insulation from cold, walls are shared and multi-roomed structures are sheltered by a single roof. During calamities like heavy rains or storms, huts are blown off or badly damaged. In such emergencies another hut is hurriedly set up using the old material or extensive repairs are carried out to the earlier hut. The house plan is of two types: circular with slanting roofs and rectangular with inclined roofs.

The primary material of construction is mud, which is brought from nearby a pond, i.e. *Gadhaye.* Stone and clay are other raw materials of construction. Besides mud bricks and mud plaster are also used during construction. Cow dung is used as a waterproofing agent. Wooden poles, straw and bamboo are used in the construction of doors, window frames and roofs. Metals and paints are also used for construction of houses.

The walls of the mud houses can be differentiated according to their shape and thickness into four types:

- Mud walls with stones and slabs at the base of the wall
- Mud walls made by sun dried mud blocks
- Mud layering for preparing mud walls
- Mud walls coated with lime and decoration

Some mud walls among the Musahars are extremely low measuring 0.60 m. These mud walls are made to prevent rainwater from getting into the hut. The roof of the hut and houses are slanted for draining rainwater.

Other Minor Structures: In the Musahar, Kol and Mallah settlements the men are responsible for building the hutments (walls, floors and roofs), boundary walls, courtyard, cattle pens, hencoops and pigsties whereas women add to the finish of these structures. The women also add a variety of minor structures like hearths, pit hearths and storage bins (Ansari 2000: 51-78).

1. Hearth: The place where cooking is done is called *chulha* (hearth), while the cooking and serving areas together are called *chauka* and the area of raw-food storage is called *kothar*. However, in practice the usage may not necessarily be consistent among various caste groups. *Chulha* (hearth) literally refers only to a hearth, which is usually shaped like an ‘U’ resting on its side; with walls on three sides, the open end facing the user and is about a foot high. Fuel is fed from the open end. The hearth is often plastered with clay. Variation in traditional hearth can be commonly seen in the present day rural area.

The *chulha* is placed outside as well as inside the huts among the Musahars and Mallahs while among the Kols it is always inside the house. Firewood, dried leaves, straw, cowdung cakes, fuel balls and charcoal are used as fuel. The basic method of cooking includes roasting (meat and

fish), grilling (meat, fish and vegetables), boiling (meat, fish, vegetables, pulses, rice), frying (cooking food in fat, vegetable oil and ghee), simmering (water or other liquids), and steaming (vegetables).

The hearths (Ansari 2005) used by the Musahars, Kols and Mallahs are as follows:

- ‘U’ shaped mud hearth
- ‘U’ shaped stone hearth
- Three stone hearths
- Hearth inside the stone and mud platform
- Open hearth
- Pit hearth

The ethnographic study has helped in understanding not only the various types of hearth pattern but also their utility and function and possible understanding of hearth pattern in the area;

- ‘U’ shaped mud hearths and hearths inside the stone and mud platform are used for cooking and roasting.
- ‘U’ shaped stone hearths are used during occasions and social gatherings.
- The three stone hearths are used for roasting and for cooking during rainy season.
- Open hearths are used for roasting.
- *Sigdi* is used for cooking and warmth during winter season.
- Pit hearths are used for cooking, roasting meat and warming food.

It is very important to understand the context in which the hearth has been found in the archaeological context. Food refuse and the material found associated with the hearth or the cooking area should be collected in this light. This will not only highlight the cooking style but also reveal what the intake was like. Cooking done in an open hearth will lead to minimal remains. And that in the regular hearth will lead to many important finds.

2. Storage Bins: Ethnography has been useful in understanding many aspects of material culture in archaeological studies of recent times. An attempt to formulate an ethnographic model of clay storage bins (*kuthila*, ‘*Kuthali’* or ‘*Kuthala’*) through research among the Kols and the Musahars has been carried out. The technological details like tempering material used, manufacturing details of platforms, storage bins, their typological variation, the designs and decorative motifs, wall-storage and *puri* pot and ethnoarchaeological study is already dealt elsewhere (Ansari 2000: 51-78).

3. Structures for Domesticated Animals: The animal shelters are more permanent and occupy a certain place in the settlement. Animal shelters are mainly seen in seasonal, semi-permanent and permanent settlements. Nearly every household owns at least one or two domesticated animals. All simple communities domesticate hen, goats and cattle while pigs are reared only by the Musahars. Dogs are domesticated among the Musahars and Kols as guards and hunting companions. These animals are raised for: food consumption (meat, egg, milk), agriculture (cattle), sacrificial offerings and rituals (hens, goats, pigs), sale (pig bristles, animal skins) and fuel (cattle dung).

a. Hen Coops: Hencoops found among the Musahars are of the following varieties; Free standing stone enclosure, Paved stone enclosures outside the hut, Paved stone hencoops inside hut and Hanged basket.

b. **Pigsties:** The Musahars make a peculiar type of a sty next to their dwelling, preferably in the courtyard. They collect stone slabs for constructing the sty. These are the enlarged version of the hencoops measuring 2.5 m long, 1.50 m wide and 1 m high. Two openings are kept measuring 40 cm wide each. Stone slabs are used to cover the openings. Broken pots with grain and water are kept near the opening of the sty. Pigs are reared for meat and bristle. Besides, pigs are also used as sacrificial offerings by the other communities. The Kols and Mallahs do not rear pigs.

c. **Goat pens:** Goats are kept outside in the courtyard in the open or inside the huts among the simple communities. Cover enclosures are also made by the Kols for goats. Goats are always kept near the cattle pens. Extended roof shade is given next to the huts by a roof, supported by posts. Goats are never tied and are kept free under these extended shades.

d. **Cattle pens:** A variety of cattle pen were observed among the Kols. They are as follows: Cattle tied in the open spaces in the courtyard, Mud houses surrounding the open cattle pen, Covered enclosure as cattle pen and Covered space for (*kothris*) nights or in inclement weather

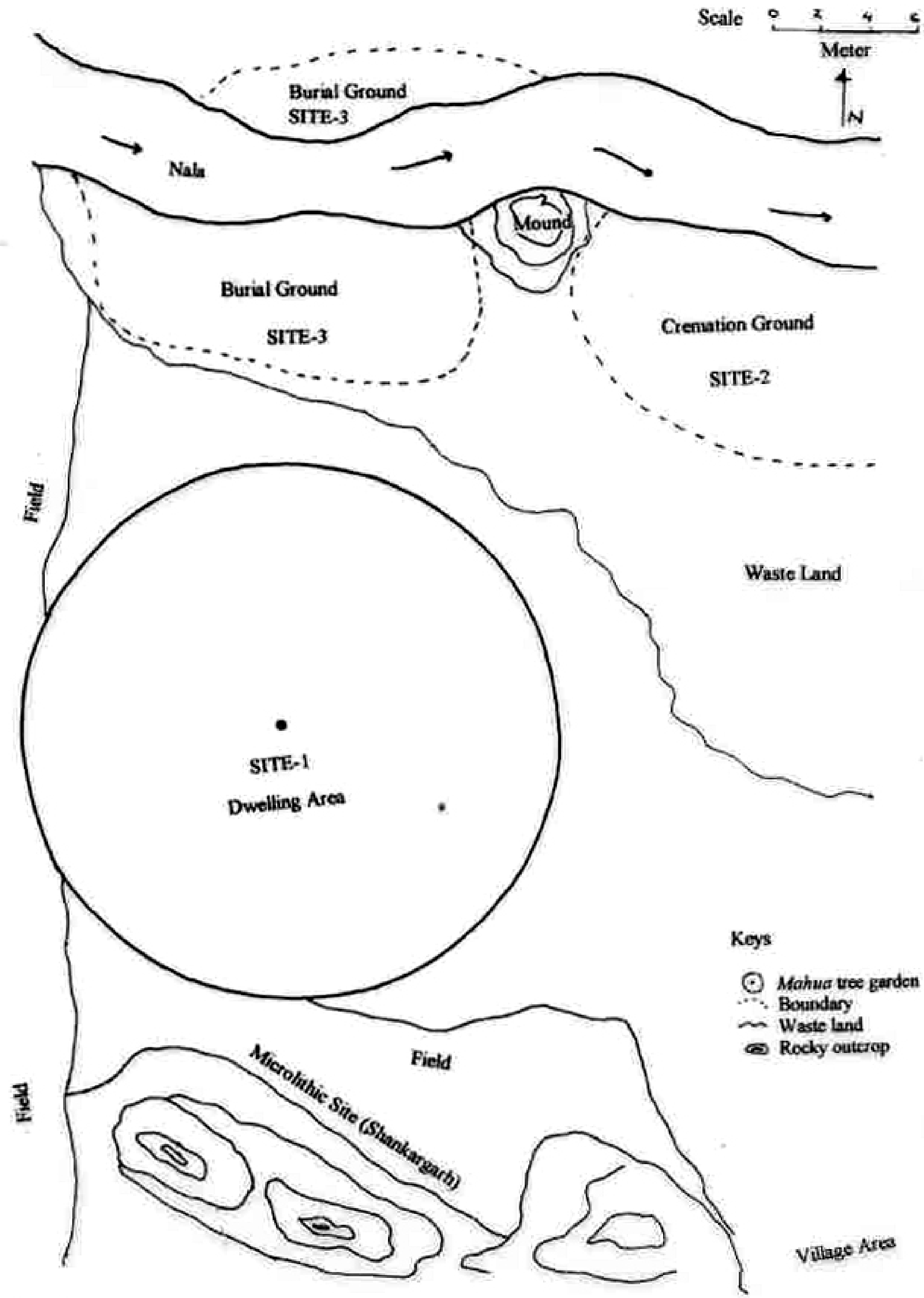


Fig. 1: Layout of Musahar settlement type I (seasonal open air settlement)

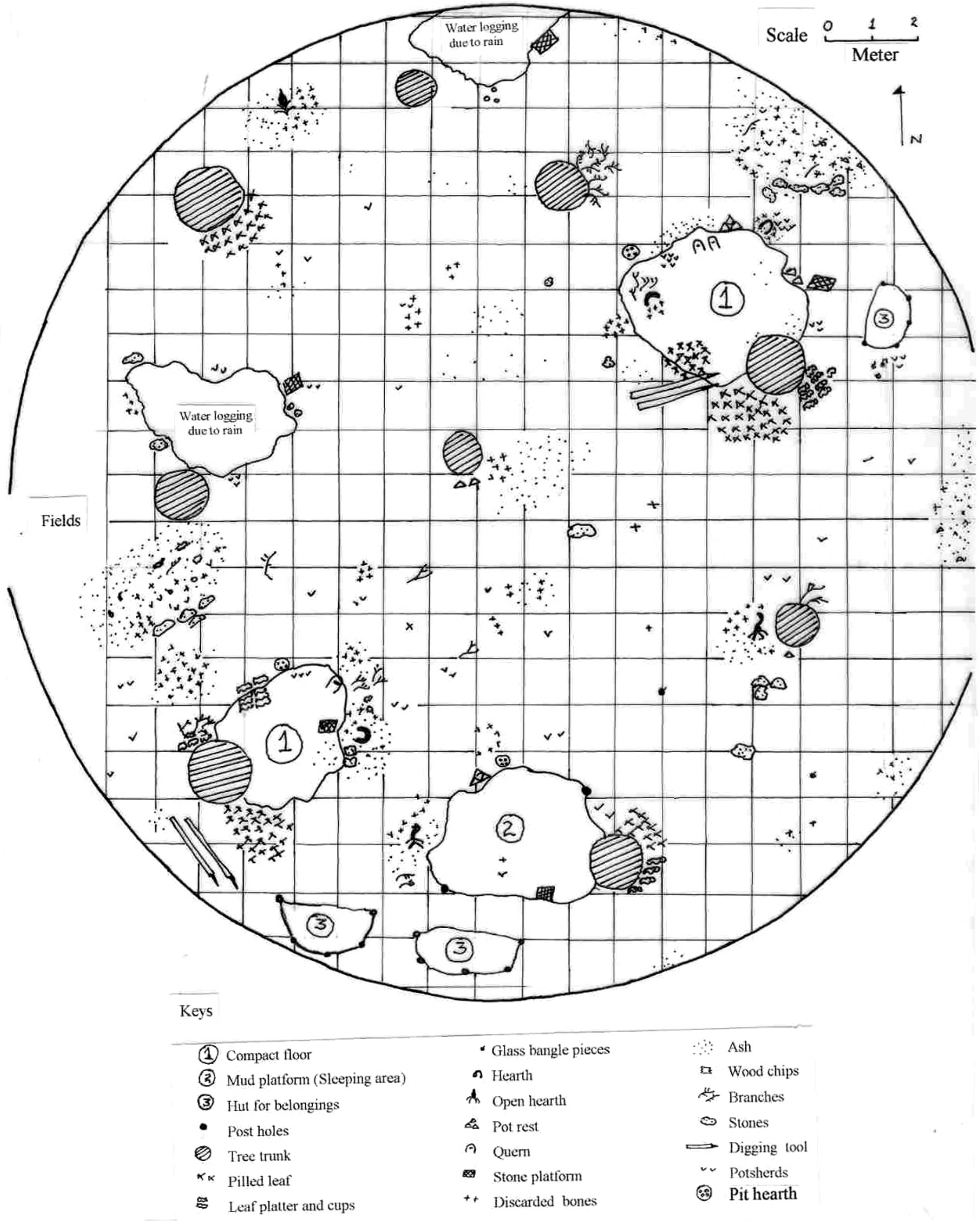


Fig. 2: Layout of Musahar settlement type I (seasonal open air settlement, dwelling area)

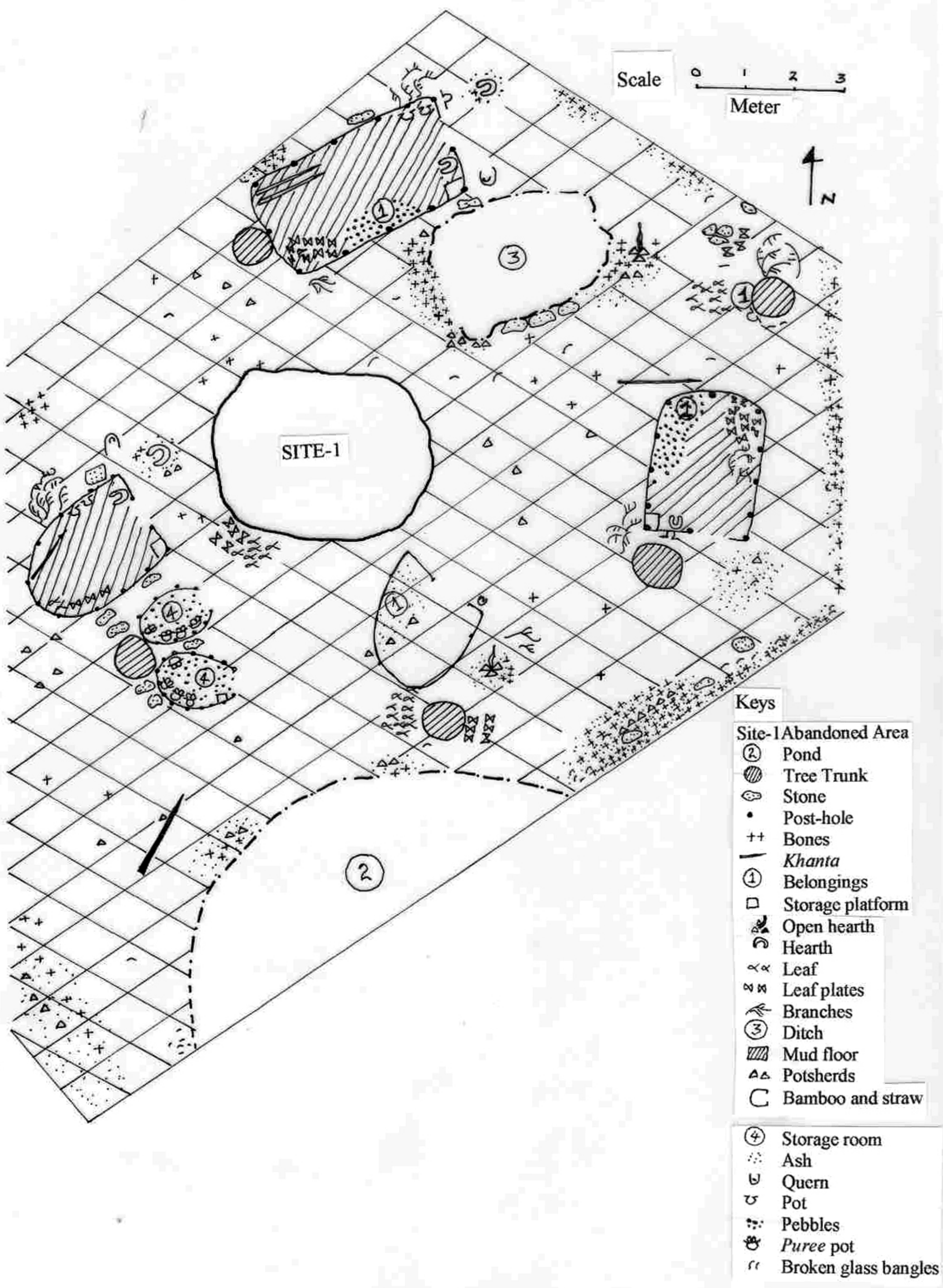


Fig. 3: Layout of Musahar settlement type II (seasonal summer settlement)

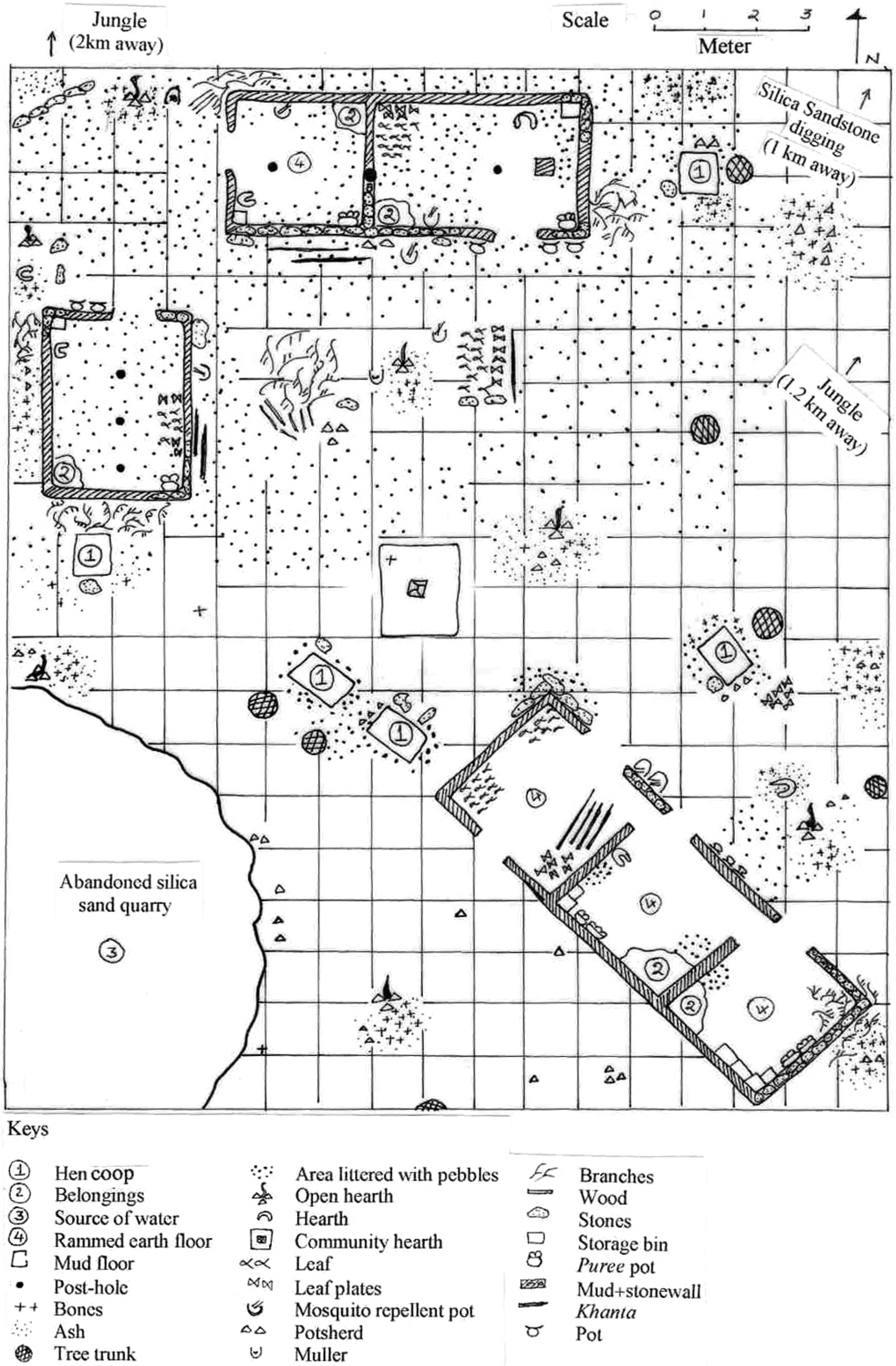


Fig. 4: Layout of Musahar settlement type III (semi-permanent settlement)

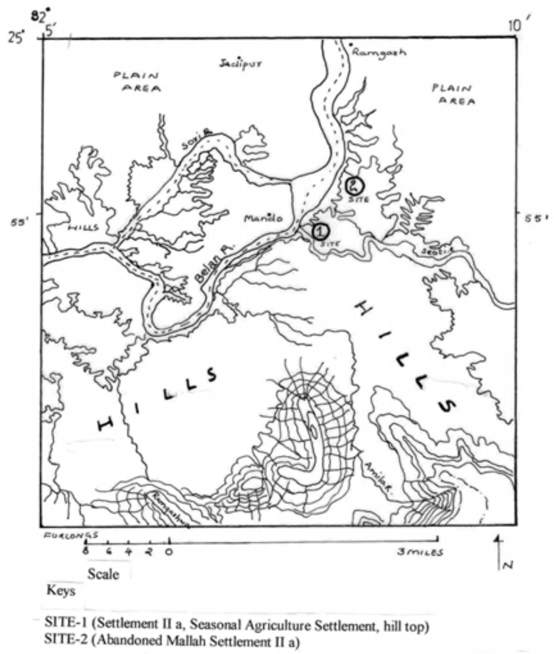


Fig. 5: Map showing village Mando, Site I (settlement type IIa, seasonal agricultural settlement, hill top)

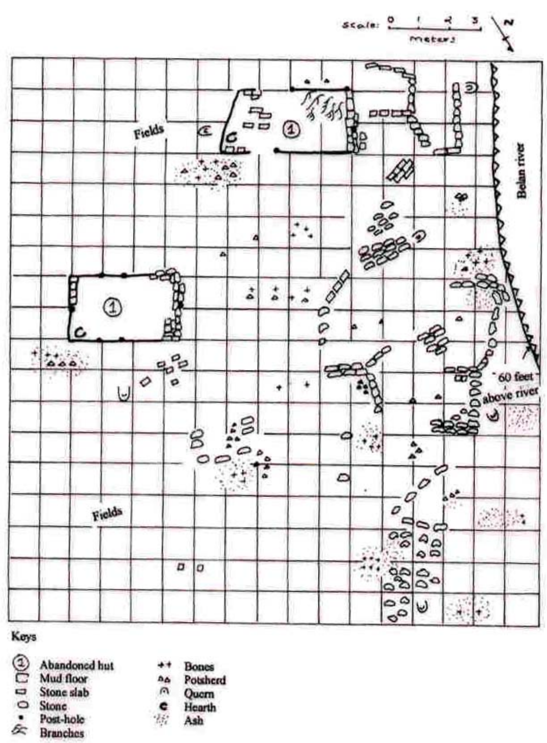


Fig. 6: Layout of abandoned Mallah settlement type IIa (hill top)

4. Sanitary Facilities: Mostly broken or discarded items are thrown next to the dwelling area, over courtyard walls, into gullies and pits. No attempt is made to carry the accumulation of animal bones, broken pottery and glass pieces, and other broken objects out of the settlement. It is only the settled agriculturists who make manure pits i.e. *pansi* in which refuse material is collected for use as manure. The houses are without urinals, latrines and bathrooms. Men, women and children go to nearby fields or in the open to answer the call of nature.

5. Disposal of Food Refuse: The disposal of food refuse in the **Musahar Settlement** is**;**

In the Seasonal Open-Air Settlements disposal of food refuse is done in the habitation area itself and no specific effort is made to clean the thrown refuse. The bones were seen scattered in the following contexts: embedded in the floor of the compact earth of the dwelling area; in the hearth area, in abandoned hearths, when roasting meat in the open with twigs in pit hearths; dumps located about 2 m away from the dwelling area and throughout the habitation area.

In Seasonal Summer Settlements the bones were seen scattered in the following places: around the pond or water source; about 2 to 4 m away from the dwelling area; and in hearths, roasting area and abandoned hearths. In Semi-Permanent Settlements the bones were seen scattered in the following places; behind huts; about 6 m away from the dwelling area and in the hearth and abandoned hearths. In Permanent Settlements the rubbish is fed to the domestic pigs. The bones were seen scattered around rice fields to attract rats; behind huts; in the hearths and abandoned hearths and in the manure pits (*pansi*).

Kol Settlement: In all the types of Kol settlements, i.e. Seasonal Settlement; Semi Permanent Settlement, Hamlet; and Year Round Permanent Settlement, Small Village the bones were found behind the hut, in refuse dumps, located about 10 m away from the dwelling area, in hearths and pit hearths, and manure pits (*pansi*).

Mallah Settlement: In Temporary Fishing Settlements disposal of bones were seen on the banks of the river, behind the hut and in the hearth area. In the hearths there were broken fish bones (Ansari 2001b: 49). In Seasonal Agricultural Settlements, hill top the disposal of bones was seen scattered in the agricultural fields; dumped behind the huts and in the hearth area. In Seasonal Agricultural Settlements, Receding Ganga the

bones were seen around the dwelling area, mainly near hearths. After the water level of the Ganga rises the river carries away all the material remains, and nothing remains at the settlement, including bones. In Permanent Settlements the fish bones were disposed of in the hearth fire, or eventually thrown behind the hut or in the rubbish dump situated 15 to 20 m away from the settlement. The animal and fish bones are indicators of the activities of the occupants, their food habits and also, to some extent, the type of settlement in relation to the dispersal and discard of bone remains. They are already studied in the settlement study context elsewhere (Ansari 2001b: 51).

Economy, Technology and Material Culture

Although some part of this work has been published elsewhere (Ansari 1999-2000, 2001b) an attempt is made here to present a brief description of their subsistence pattern.

a. Hunting and Fowling: Extensive fieldwork was carried out on small game hunting practices among the three communities. Rapid destruction of forests and the segmentation of forestlands by roads, buildings, factories and agriculture have severely reduced the natural habitats of big game. The tradition of small game hunting has little economic importance but is still practised among the simple communities in the study area. They usually hunt while gathering leaves from nearby forest areas.

The Musahars are expert in the hunting of rats, squirrels, tortoises and birds. They consume 36 types of small and big animals including snakes but killing of monkeys and cows is a taboo.

Rat hunting: A peculiar type of rat hunting practice sets the Musahars apart from other rat hunters like Irulas, Murias, Bondos and Yanadi. The tools used for hunting are; A multipurpose tool '*khanta*' has an iron head hafted in bamboo (generally used for digging, cutting, hunting and also for protection), an iron tool '*Gahdala*' is used for digging and burrowing, sticks of various lengths and sizes and a bucket of water.

Two to ten people hunt the rats i.e. *mus* depending on the quantity required. First and foremost is locating rat holes and to make sure that the rats are in. The Musahars excel in differentiating the rat holes from those of other burrowing animals. Generally the rat holes are near or in the agricultural fields. The average diameter of a burrow varies from 15-20 cm and some are 2 m deep. Every burrow includes surface openings, feeding tunnels, nesting chambers, and a food cache. Feeding tunnels are parallel to surface, while storage chambers are usually found at greater depths. Sometimes there may be as many as seven to ten adult as well as young rats in a single hole. The Musahars also take out the grain collected by the rats in the hole. The best season for rat catching is when the grain is ripe and threshing of grain starts.

Technique: After tracing the rat hole one man starts digging the hole with *khanta* and a second man simultaneously pours water with the bucket after the feeding tunnel is clearly visible. This whole process is to scare the rats inside the hole. The water suffocates the rats and they try to escape from other outlets. Meantime the accompanying children stay by the other outlets of the rat holes and wait with sticks in their hands. When a rat tries to escape, it is killed by a stick or is caught by bare hands. In the other situation when the rats do not escape and die inside, the hunters dig them up. The Musahars prefer field rats to other types. They never eat house rats as they claim the house rats stink and don't taste good. Many Musahars keep rats captive in small pots for later consumption. These pots are generally placed/buried in one corner of the house.

The most significant feature of rat hunting among the Musahars is the minimal use of tools. After the rats are caught preparations for roasting them begin. The kill is distributed equally among all the hunters. From the ear to the tail every part is consumed and nothing is wasted. The waste body parts, the incisor and the burnt twigs remain behind. No blade or knife is required to cut the rats, the rat's incisors are sharp enough to carry out the task. After ten days the site was again visited to check the remains, and it was noticed that the wind had blown away the twigs and ash and just an ashy appearance and incisors remained. Rats kept in the pots buried in the ground for later consumption, but for some reason never consumed, were the only evidence of rats found from the Musahar house.

Squirrel hunting: Men and children hunt the common striped squirrel i.e. *Sciurus palmarus.* Children use catapults while men use sticks to kill them. To hunt a squirrel at least four men are required. When men are hunting only the

adolescent boys are allowed to accompany them, the reason being that small children will make noise and scare away the squirrels.

Technique: Firstly, trees are searched for squirrels, if they are sighted, one of the men climbs the tree and the others stand about 2 to 3 m away on three sides. Each one knows well his place for chasing the animal once it is on the ground. Now the man up in the tree starts shaking the branches and simultaneously making loud noises to scare the animal. This takes some time as the squirrel jumps from one branch to other very fast; and starts tiring. Once the animal comes down the man nearest runs towards it and gives it a blow with the stick. One hit and the animal faints. It is then picked up and the legs are broken, because the Musahars say the animal is smart and fools the man by acting dead and often runs off. The Musahars never kill the animal completely till they start the fire for cooking. In the other type of squirrel hunting about 15 to 20 men take part. In this a group of trees, or trees in a row are selected. For example, if there are about six trees in a row, then six men climb on individual trees and the others surround the base. The same hunting technique described above follows, the only difference being that large numbers of squirrels can be caught.

The procedure of roasting is similar to that of rats. However, the squirrels are rarely taken to the settlement, and are always relished at the hunting spot. The meat is equally distributed among the hunters, and from ear to tail every part, barring incisors is consumed. In one instance the squirrel was pregnant, the babies were removed and placed on green leaves and were disposed of in water, but the adult was consumed.

Tortoise hunting: The Musahars catch tortoises (*Chelonia*), the slow moving freshwater reptiles. The tools required to catch tortoises underwater are the digging sticks and *khanta*. Generally young boys and women catch tortoises from ponds and lakes by hand, and bring them alive to the settlement.

To cook the tortoises, first the Musahar women light a fire and wash the tortoise. The body of the tortoise remains within its shell. The neck, limbs and tail are outside the shell but when the tortoise is caught they retreat inside the shell. It is very important to kill them before roasting and hence they are placed near the flames. Due to the warmth the tortoise brings out its head, and the women immediately break the neck with their hands. Tortoises are roasted so that the body can be loosened from the hard outer bony shell. After roasting the inner layer the bony plate is opened by hand. Once it is open the flesh is removed. This is then cooked with oil and spices. The outer shell and the bony plates are placed on the roof of the huts to dry, to be later powdered and eaten as medicine for stomach ailments. Large quantities of discarded bones and shells were seen scattered inside the old hearths, behind the huts, and in the settlement.

The ethnographic work carried out by the author among the Musahars has helped in understanding the reasons why the faunal material at archaeological sites was either found in the hearth or in the habitation area and also the placement of hearths outside in the open:

- The placement of the hearth is always outside the hut because roasting, gives off a lot of smoke and the smell of burnt flesh.
- For roasting the Musahars often place the hearth wherever suitable with the direction of wind in mind so that the smoke blows away from the house. The tortoise is roasted in the hearth and the remains are left in the hearth. The shells are tossed into the fire.
- When new hearths are made, the old ones are left with the remains of tortoise and other animals lying in them.
- If the hearth is cleared, the bones and shells are usually thrown behind the hut.
- The Musahars also bury these shells in rice fields as they attract field rats.

Hare and Porcupine hunting: The Kols and Musahars hunt hares and porcupine while collecting wood in the forest. To trap hares they use nets. To trap porcupines they throw nets on them or place nets on the trails frequented by them.

Placement of Nets: The net measuring 8 m in length is placed in a rectangular fashion and tied to wooden posts struck on three corners, with a small opening in one corner for the animal to enter. In the middle of the enclosure food is kept to attract the animal. If on the first day the animal is not trapped, on the second day they dig a trench measuring 1m × 1m and 2 m deep. It is covered with leaves and branches and food is kept on the cover. The animal visits the specific location and

falls in the ditch. This method is employed for hunting boar, deer and nilgai.

Once the animal is caught it is brought to the settlement, killed and processed. An open hearth is lit for roasting. The hair is scraped off with a sharp stick. The body is slit open with a sharp stick or knife and the viscera removed. The animal is roasted again in the fire and then consumed. Hare meat is cooked with oil and spices. Remains found around the open-hearth area are burnt hair, viscera, teeth and chewed bones. The same procedure is adopted for roasting of porcupines. However, before roasting the animal its quills are removed. Remains found at the hearth area are quills, viscera and chewed bones. Besides open hearths, animals are also roasted in regular hearths.

Bird trapping: Musahar men and young boys generally trap all types of birds available in the area except vultures, eagles and owls. The birds are either hunted for consumption (20 types) or for sale (5 types) in the market. The techniques to trap birds are;

- Nets
- Catapults
- **Gummed bamboo sticks:** The Musahars apply gum of *Acacia arabica* Willd. to bamboo sticks about 30 cm long. These are placed in-between the branches and leaves of any fruit bearing tree. When the birds come into contact with these sticks, they are trapped.
- **Wells:** In this method birds like pigeons, which like to sit in a well for its coolness, are trapped. About four to six people simultaneously cover the well with a net on which gum is rubbed from the top. Then make a lot of noise to scare the birds, which causes them to fly upwards. In this process they get entangled in the net and get stuck to the gum applied on it. The net is then overturned and the birds are plucked from it.

If the birds are caught in large quantities or are big sized they are brought to the settlement, otherwise they are consumed on the spot. Twisting of their necks kills the birds. Immediately the feathers are removed and the birds are roasted. After this the abdomen is cut with a sharp stick or knife and waste parts are removed. The bird is again roasted from the inside. Small birds are always eaten roasted but large birds are elaborately cooked. It is interesting to note that of the small birds beside the beaks, feathers and waste body parts nothing remains at the site; everything else is consumed. But when big birds are cooked and consumed, the leftover bones are thrown in the hearth or behind the hut.

Organisation of labour: Division of labour is done according to age and sex. Men do the more strenuous work while women attend to more delicate and simple tasks and children do the lightest work. The following table shows the division of work carried out by them:

Organization of labour for small game hunting and fowling among Musahars

Men	Women	Children
Hunting of small animals, including rats, squirrels, hares and porcupine. Roasting of the animals hunted	Processing and cooking of animals hunted	Hunting of rats and squirrels.
-	Catching of tortoises in ponds. Processing and cooking them	Catching of tortoises in ponds and lakes
Trapping and roasting birds	Processing and cooking them	Trapping of birds with nets
Selling of birds in local market	-	-

b. Fishing Practices: Fishing plays an important role among the Mallahs and Kols. The rivers and lakes in the study area contain an abundance of fish of different varieties. The Mallahs live along the rivers and lakes, and have an expert knowledge of the habits of the different varieties of fish found in the area. However, only few Mallahs make their living solely by fishing. The aquatic food has an exceptionally high degree of nutritional value. Characteristically fish is rich in protein, fat, vitamins, calcium, phosphorous, iodine, and common salt and most of these food values are also retained in the fish, which are sun dried and consumed later.

Species Exploited: The Mallahs and the Musahars have local terms for the fish caught by them. The author collected the local names the scientific names were collected from Bilgrami 1991: 87-89 and Jhingran 1983: 5-66, 98. A list of 60 fish

exploited by the Mallahs and Musahars in Ganga and Yamuna is given elsewhere (Ansari 2001b).

Methods and Techniques of Fishing

Riverine fishing: Fishing is a year round activity. In the rains the pace of fishing is more hectic, for then some economically important varieties of fish, like rohu and hilsa are found in abundance. In deep river water, fishing is done from boats using nets. During the summer the rivers shrink and change into shallow streams and pools. Then the method of fishing is restricted to using traps and small nets.

Lacustrine fishing: Fishing is also carried out in *jhils* and tanks, which are the breeding grounds of many fresh water fish. Innumerable tanks are scattered throughout the study area. Fish are caught with nets and traps. In large tanks fishing is done with nets, hooks and prongs. In small tanks fishing is done in summer when the water is shallow. Fish are then caught by hand, sticks, and cover baskets.

Paddy field fishing: The paddy fields, which retain water for two to three months, provide an additional supply of fish. Fishing is carried out in the rainy season, in small pools in rice fields with baskets, hooks and by hand.

There are eight types of fishing techniques (Ansari 2001b): Fence/Screen fishing (*Chilwan, Chinta*), Fishing with traps *(Tap, Chhaup or Kurimar, Ganja)*, Fishing with nets (*Bhawar jal*, *Maha jal*, *Bisri or chhot-ber jal*, *Fasila jal*), Fishing with hooks and lines (*Katia*, *Barra*, *Ballum*, *Pachki*), Fishing by sticks and hands, Fishing by explosives, Fishing by poison and Fowling while fishing.

Spawn collection: Besides fish spawn or fish eggs are collected from the fish breeding grounds. Mostly the fish eggs are collected from 30 to 60 cm deep meandering rivers, lakes and ponds. The method of collection is by disturbing the bottom of the water and scooping up the eggs with a piece of cloth. Frequently nets of small mesh size are placed against the current and pulled up for the collection of eggs. In the Ganga the spawns are collected from May to September. Young and newly hatched fish are collected from July to October. *Catla* and *rohu* eggs are collected for breeding and selling. The eggs when brought are stored in especially prepared mud pits. The size of these mud pits ranges from 0.50 to 1.5 m in diameter and 0.50 m in depth.

Organisation of labour: Fishing is primarily a male activity but there is no taboo against women taking part in it. The division of labour among the Mallahs is given in the following table:

Division of Labour among the Mallahs

Men	Women	Children
Cut and carry back the bamboo, hemp and *munj* grass for making the baskets, nets, ropes and shafts.	-	-
Acquire iron hooks, net sinkers and nylon strings from the local market. Help in making baskets and fences.	Make baskets, and ropes for fishing.	Make ropes
Make and apply tan to the nets, fences and baskets.	Apply tan to baskets and fence.	-
Fish with nets, fences prongs, iron hooks, and by poison and explosion and row boats.	Hunt with hands and sticks, fences and baskets.	Hunt with hands and sticks, fences and baskets. Row boats.
Fish in the deep water, rivers, lakes, ponds, *gadhaye* and streams.	Fish in shallow water, by wading in shallow beds.	Fish in shallow water, lakes and paddy fields.
Help in drying and preserving the fish.	Carryout different processes for preservation of fish.	Help, in drying small fish.
Sell fish in the local market.	Carry fish in village for sale.	-
Spawn collection	-	Spawn collection

Consumption of fish:

- Fish are roasted inside a hearth or in an open fire. They are rarely cleaned and cooked whole. Generally small fish are consumed roasted.
- Fish are cooked with spices. Sometimes all the body parts including head are consumed leaving out only the fins, tail, scales and viscera.

- Oil extracted out of fish is used for cooking and for massage.

Local Markets: The Mallahs supply fish in the nearby villages and to the local market. They also sell fish at the riverside and on bridges.

c. Gathering of Wild plants among the Kols and Musahars: Ethnobotanical fieldwork by the author was carried out for three seasons in a number of villages inhabited by the Kols and the Musahars.

The aim was to understand the use of wild plants by these who still largely depend on the forest flora for their sustenance and livelihood. These communities exploit the resources of forests, rivers and hills; and they have a rich knowledge of wild plants. From here the Kols and Musahars collect a wide range of foods and utilise many trees, shrubs, herbs, tubers, roots, leaves, flowers, fruits, seeds and gums for their subsistence and for day-to-day needs. To collect these plants the Kols and Musahars use organic made tools like *laggi*, *khara*, *khonch* and *baiyya* besides *khanta* which is always carried along.

The food habits of the Kols and the Musahars are related to the availability of resources. For instance, the Kols for their subsistence collect and sell wood from the forest. In the process of gathering wood, the Kols also collect plants for their consumption and other needs. Both men and women carry out the gathering of plant foods and wood. The Musahars collect leaves for making leaf platters and cups and supply them to the villages and the markets in Allahabad. During the collection of leaves, which is carried out by men, women and children, they also gather wild plants from the forest for consumption. These natural granaries provide them with enough energy, proteins, fibre, vitamins and essential minerals for their diet. The Kols and Musahars have also learnt to utilise many plants and plant products for medicine, fibre, cordage, oil, timber and wood work, making of brooms, basketry, dyes, and as fuel and poison ever since primeval times.

Ethnobotanical Survey: An ethnobotanical survey was carried out in the remote villages inhabited by Kols and the Musahars. The aim was to gather information on the traditional use of plant products in day-to-day life and healthcare. Men, women and local herb sellers among the Kols and Musahars were consulted regarding the details of the plant parts used. Lists of plants used by them for various purposes are made with details (like Family, Botanical and Local names and the parts used; Ansari 2001a) are as follows; Eaten as vegetables (39), Flowers cooked as vegetable (4), Eaten as fruits (22), Tubers consumed as food (4), Fibre plants for making cordage (5), For making leaf plates and cups (8), Basket making (4), Dye (3), Plants exploited for extracting oil (4), Plants used as gum (5), Plants used for construction, roofing and thatching (24).

Plants used for Healthcare: The flora of the forests plays a vital role in the life and healthcare of the Kols and Musahars. The plants used for treatment of various ailments are locally collected and the ways of application vary according to the methods of traditional use. The same plant is used for treatment of different diseases in different ways. Various parts of the same plant are utilised for different types of diseases. The plants having medicinal properties used for healthcare were collected by the author and were been studied according to their herbal properties. A list of 117 plants have been documented with Family, Botanical and Local name, their parts used, and the diseases they are used to fight against (Ansari 2001a).

Honey collection: Honey is collected by the Musahars during spring and summer seasons from beehives situated on trees. They store honey and wax for their own consumption and sell the rest in the market for cash. The technique used for collection is as follows:

- When climbing the tree on which the hive is located a Musahar carries a hatchet or *chot kulhari*, a small bucket tied to the waist and a bunch of *neem* leaves and a rope.
- After reaching a spot under the hive the man sets alight the bunch of green leaves, which emit smoke and heat, ultimately driving away the bees.
- The man chops the beehive with the hatchet and collects the hive in the bucket. If the man is on a very high tree he lowers the hive with the help of a long rope.

Organization of Labour among the Kols and Musahars

Men	Women	Children
Cut and collect wood for fuel, sell in the market	Collect wood, branches and twigs for fuel	Collect fallen braches and twigs
Collect and sell medicinal plants in the local market	Collect medicinal plants from forest	-
Collect fibre and make ropes	Collect vegetables, tubers, gums and fruits	Collect vegetables, gums and fruits
Collect leaves, make leaf plates and sell in the market	Collect of leaves, making leaf plates	Collect of leaves for making leaf plates
Extract oil from oil seeds	-	-
Collect of honey	Collect of honey	-

Gathering of plants is mainly a woman's job but men carry out the more arduous jobs of collecting forest products. The Kols and the Musahars are now coming in close contact with more developed communities of the area which has opened to them new avenues of subsistence and resources, resulting in a shift to labour, in the form of field labourers and as menial workers. This acculturation is taking away their knowledge of the plant world and their utility. These communities should be thoroughly studied for more information, especially their knowledge of medicine.

Collection of fuel: Fuel is necessary for cooking and for providing warmth during the winter season. The main types of fuel used are: Locally collected firewood, branches and twigs, cow dung, and stalks and kerosene. Of the three, firewood is the most reliable and important source of fuel among the Musahars. Among those who settle in farmsteads and villages and subsist as agricultural labourers and as settled agriculturists, their main source of fuel is the farming by-products. Firewood is also collected as dung is used primarily as fertilizer. Kerosene is popular, but it is used mainly for preparing meals and for lamps.

d. Agriculture: Agricultural activity dominates the cultural landscape of the study region. However, the Kols, Musahars and Mallahs generally do not own cultivable land and work as agricultural labourers i.e. *harwah* (*ploughmen*). They work in cooperation in the field and have a division of labour according to sex and age. Men carry out the more strenuous work while women attend to more delicate and simple tasks like sowing and harvesting.

e. Basketry: The Mallahs, Musahars, Kols, Dharkars and Kahars all specialize in bamboo basket making, the Ansari and Pasi make *munj* baskets, while cane basketry is a multi-caste activity. The aim was to understand the utility and usage of organic materials in day-to-day life. Therefore, importance was given to the acquisition of raw material and the tools and techniques employed in basket making. The main occupation of these communities varies, though basketry supplements their source of income. They hire bamboo plants in the village for a certain period of time as bamboo regenerates after it is cut, and pay the owner in kind. They, mainly Dharkars supply baskets to the villagers in lieu of a fixed amount of grain collected at each harvest. The remaining baskets are carried to village markets (*bazaars*) and sold for cash or traded for grains.

The baskets are made in the open in front of the houses. Women working in groups or alone carry out the work. Besides, as a source of income, basket making is culturally important in the sense that it is a group activity and carries social significance as singing and interaction among the community members takes place simultaneously with work. The men and women are both involved in basket making. But men mainly acquire the raw material and sell the prepared baskets in the local market, while women make and colour the baskets. The baskets are perishable in nature but their utility in day-to-day life is high. They are used as a means for transporting, gathering leaves, sticks and cow dung, as containers for storing grains and vegetables and to keep important belongings. During religious functions, and at birth, marriage and death ceremonies the baskets are used.

Evidence of organic material in archaeological sites is rare. But the ethnographic study helps in understanding the extensive use of this material, manufacturing techniques, utility of baskets and use of multi purpose tools in their manufacture. *Banka* for example is used during basket making and also for cutting animal flesh. These

communities use items like beads and cowries to decorate their baskets. This adds a new perspective to the recovery of beads and cowries from archaeological sites, as the prevailing view is that beads and cowries are used only for personal adornment and often as a form of currency or for trade.

Implications of Ethnography for Understanding Prehistoric Living Patterns

Settlement patterns: The settlement pattern study has a number of implications for archaeological analysis in the study area. One cannot have a role model of a settlement pattern type to interpret the archaeological evidences for particular site or sites. The simple communities inhabiting the study area are in contact with advanced communities and they have very distinct settlements. These settlements can be distinguished from one another by the degree of permanence. The settlements of the past were distinguished according to their morphology, form and layout of the site, hearth area, dwelling units and other features for an ethnoarchaeological interpretation.

No structures are reported from the Epi-Palaeolithic sites of the Belan and Ganga valleys and the earliest evidence of settlement comes from the Mesolithic levels. The location, size, and contents of Mesolithic sites in the Ganga and Belan valleys were controlled by the availability of lithic raw material and a variety of food resources in the form of wild plants, aquatic animals and safety from flood waters. Even today for the fulfilment of practically every need, from building material to medicinal plants, the Musahars, Kols and Mallahs turn to the forest. In this respect they are still forest dwellers that are emerging from a way of life that seldom fails to sustain them in the event of crop failure or other calamities, which usually affect settled farmers.

Structure (Hut types): In the Mesolithic site of **Sarai Nahar Rai** the floor area measuring 5.66 m in length and 4.02 m width and the postholes of the community hearth mark the structural activity at the settlement. The floor is littered with burnt clay lumps, microliths, animal bones and shells. Community hearths are also prevalent among the Musahars. They construct a hearth on a stone and mud platform, which is used during community cooking at the time of feasts as well as for day-to-day cooking and roasting of meat. This hearth is mainly used in semi-permanent settlements (Type III). The hearth is 1.5 m long, 2 m wide and 0.45 m high and does not have any superstructure. This type of hearth is always placed outside the hut. When this hearth is abandoned, one can see remains of the mud platform with burnt clay lumps, charred bones and ash.

It is interesting to note that the community hearth at Sarai Nahar Rai had four postholes at its periphery, which indicates that there was a superstructure on top of the hearth. The possibility of the existence of a super structure might point towards some social implication for the Mesolithic inhabitants. The possible structure on the Sarai Nahar Rai community hearth could have been erected on long wooden posts (fig. 7).

The Mesolithic site of **Damdama** has yielded evidence of circular and elliptical plastered floors with diameters measuring between 4.20 m to 5.35 m. Some of the floors have multiple layers of plaster and postholes. Plastered floors are also commonly seen among the semi-permanent and permanent settlements of the present day simple communities. These mud floors are periodically smeared with cow-dung. This is done to repair and level the broken mud floor. The plastered floor at Damdama was found in association with a quern, which shows that the processing of food was probably done in the floor area. It is observed that the Kols carry out cooking and processing inside the hut. The quern is always placed next to the hearth among the Kols and the Mallahs. Among the Musahars the placement of querns was seen in the floor area in Seasonal open-air settlements (Type I) and Semi-permanent settlements (Type III). Otherwise the placement of querns was outside the entrance of the hut.

The Mesolithic site of **Chopani-Mando** has yielded evidence of structural features in the form of 20 huts. The huts are circular or oval in shape and have postholes. The diameter of the floor varies from 3.80 m to 4.7 m. Some of the floors bear evidence of a stone paved floor. These huts are littered with several stone pieces, pebbles, nodules and microliths (huts of phase IIA, phase III) (fig. 8). An abandoned rectangular hut of the Kol community was studied in Semi-permanent settlement (Single Purwa Village; Type III) to examine the nature of structural remains and floor after its abandonment. Six months after the

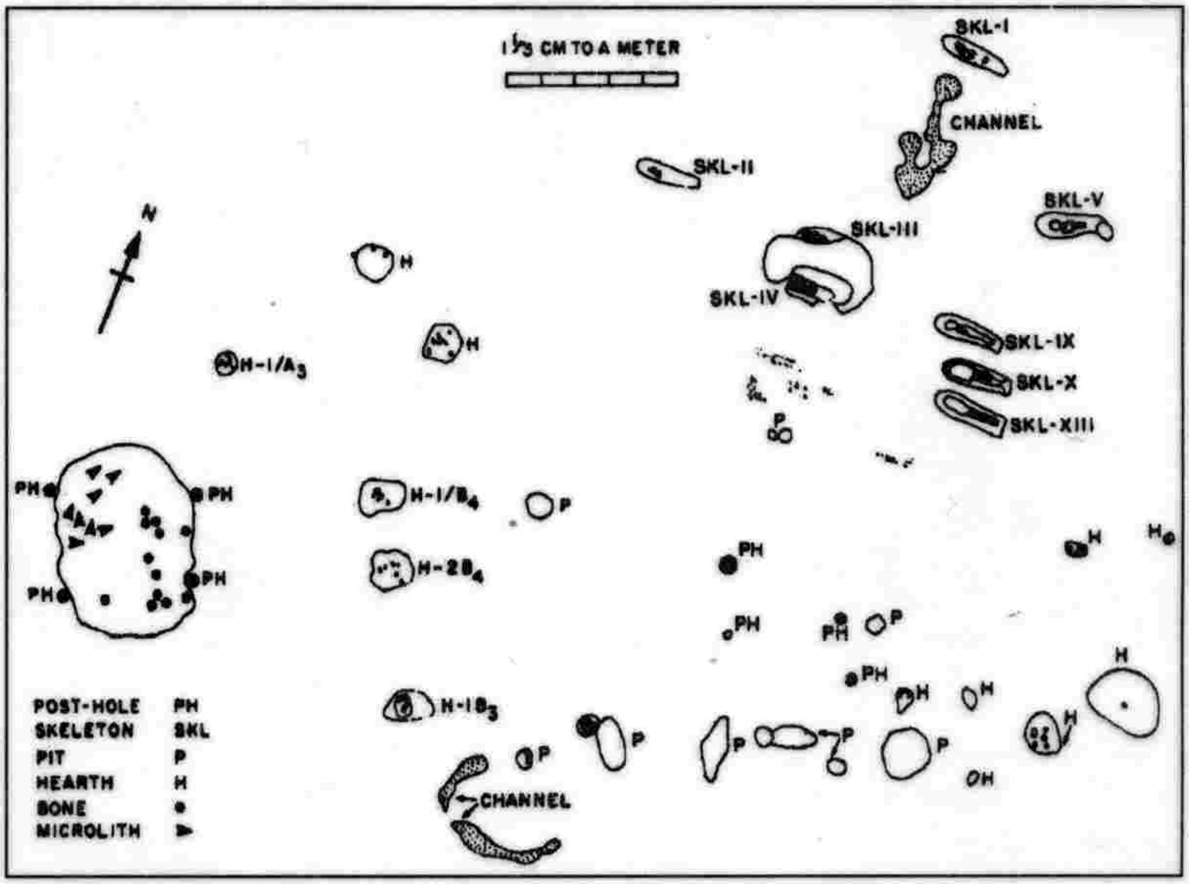


Fig. 7: Site plan of Sarai Nahar Rai (*after* Sharma *et al.* 1980: 53)



Fig. 8: Stone paved floor, phase IIB, Chopani-Mando (*after* Sharma *et al*. 1980)

abandonment of the rectangular hut, measuring 4.30 m long, 2.70 m wide and 1.70 m high, the following features were well preserved and intact.

- Stone/ mud walls
- Mud plaster on the walls and floor
- Floor
- Middle beam
- Partial thatched roof
- Hearth
- Circular stone platform for storage bin



Fig. 9: Kol abandonment hut, after 4 year

The settlement was revisited after four years. The observations showed the size of the hut, to be 4.20 m long and 2.61 m wide (fig. 9).

- No walls were visible except the stone at the base of the walls.

- Stone and rammed earth floor were littered with a few potsherds, bangle pieces, charcoal and bone fragments.
- Hearth area had ashy and burnt patches.
- Remains of circular stone platform.

This ethnographic study helped in understanding what likely remains could be expected after the abandonment of a hut i.e. stone paved floor, appearance of abandoned hearth and storage area. It was observed that most of Seasonal summer and Semi-permanent settlements of the Musahar are littered with pebbles (figs. 10, 11). The pebbles and stone pieces had been spread over the floor as well as outside the hut to control dampness and prevent white and red ants from attacking their food stores and other belongings.

The other finds on the floor included flat querns, mullers and potsherds at Chopani-Mando. It shows that though the cooking was carried outside the hut as the placement of hearth is outside, processing was carried out both inside as well as outside the hut. In the Musahars Seasonal open-air settlement and Seasonal summer settlement similar evidences were noticed. Four families residing at these settlements were effectively using a single quern owned by one family. Thus, it cannot be said that a quern symbolizes a family or family unit but many families at a particular settlement can use a single quern. For example, a settlement comprising seven families can have as many as seven or as less as two querns. These evidences were collected from village Shankargarh in Allahabad district.

The arrangement of the huts at Chopani-Mando was in a beehive pattern. Such arrangement of huts was also seen among the Musahar Seasonal summer settlements at Mawaiya and Karchhana village in Allahabad district.

It is very interesting to note that postholes of the huts were inside the periphery of the floor at Chopani-Mando (fig. 12). To understand this phenomenon, abandoned Musahars Seasonal summer settlements huts were studied (fig. 13). The study revealed important facts regarding the construction of such structures. The postholes within the periphery of the floor area were made to support bamboo and straw screen walls. Such screens are supported on a beam across the floor from both sides. The screens thus cover the periphery of the floor. They are plastered with mud or clay in some cases.

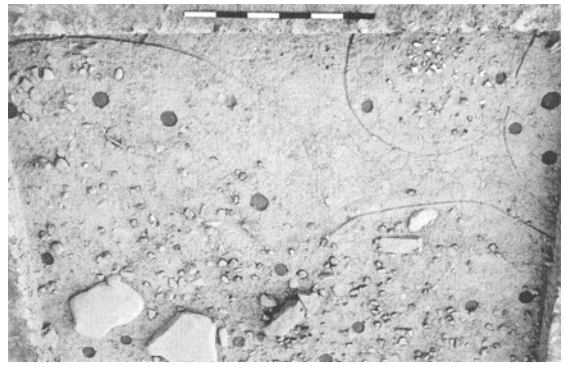


Fig. 10: Floors with stone pieces, anvils, microliths and potsherds, phase III, Chopani-Mando (*after* Sharma *et al*. 1980)



Fig. 11: Floor and hut area littered with pebbles, Musahar settlement (semi permanent)

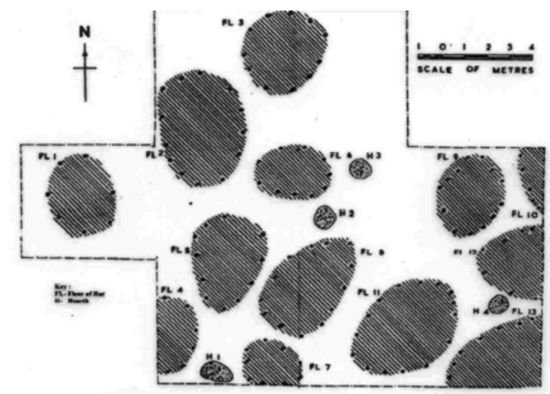


Fig. 12: Plan of huts in phase III, Chopani-Mando (*after* Sharma *et al*. 1980)

Remains of burnt wattle and daub fragments with impressions of bamboo sticks were found at Chopani-Mando. These indicate that mud plaster was applied on the screens or walls of huts. Even today wooden posts support circular and rectangular hutments and wattle and daub is constructed in the Seasonal, Semi-permanent and Permanent settlements of all simple communities. The wattle and daub construction among the

communities shows that the walls during the Mesolithic times could not have been higher than 0.70 to 1 m.

At the Neolithic site of **Mahagara**, twenty huts are reported. The floors of the huts are circular or oval on plan and they are neither paved nor rammed. The occurrence of burnt clay lumps with reed or bamboo impressions indicates the use of mud plaster on the screen walls of the huts. The floors are overlapping and the houses are sparsely situated. Such type of construction of huts was seen among the Semi-permanent settlements especially among Musahars in Mawaiya and Karchhana in Allahabad district. It was noticed that after marriage a string of room is attached to the house forming a single unit. A single unit or group of attached house (three rooms) is occupied by six to seven individuals in the Musahar Semi-permanent settlements. Thus, one can postulate that the eight-house complex at Mahagara may have housed about 48 to 56 individuals.

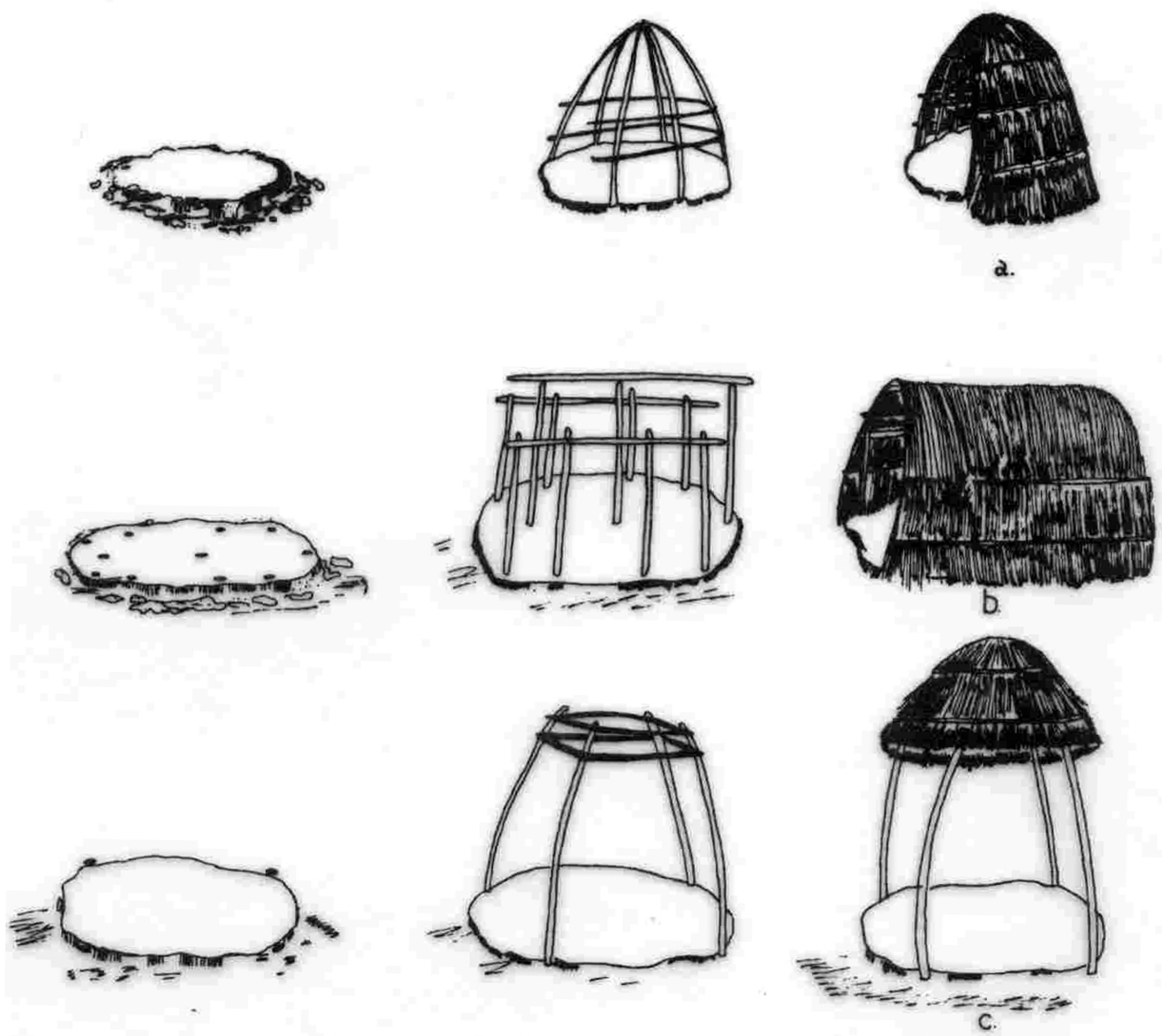


Fig. 13: Musahars hut type, construction and remnant after abandonment: a. Hut type leading to remains of floor without post-holes after abandonment; b. Hut type leading to remains of post-holes after abandonment; c. Hut type leading to remains of post-holes outside the periphery of floor

It is interesting that Mahagara has yielded huts with and without postholes. The Seasonal open air settlement of Musahars has yielded similar evidences where except a few small shelters made for keeping their belongings; they construct

irregular floors but do not make any super structure over it.

Besides, interesting facts came to light after studying abandoned huts of Seasonal summer settlements of Musahars like, how these structures could be erected without postholes. First, a raised floor (10 or 15 cm above ground) is made of compact earth. Then the long flexible branches are placed in a semi circular fashion at regular intervals, which are supported by the raised floor. On these straw was placed to cover the spaces between bent branches. Abandoned huts were studied to understand any possibility of postholes. It is interesting to note here that no postholes were visible at the abandoned hut. Thus, probably such type of construction was made for huts at Mahagara, which resulted in single, double and triple floor huts (as house units) in addition to single floor huts and cattle pen with postholes around its periphery.

A large cattle pen was enclosed by a cluster of houses at Mahagara covering an area of 12.5 × 7.5 m. Such evidence of cattle pen was observed among the Permanent settlement of the Kols. Such type of cattle pen is constructed for the safety of the cattle from wild animals. Usually only one cattle pen is seen in the Kol settlement as all the cattle, belonging to different families are kept in the same pen and the pen is regarded as a community property. About 25 cattle can be kept in an area covering 12 x 12 m (fig. 14). These pens have plastered floor, which is regularly paved with a mixture of cow dung paste and water, or have stone slabs placed at regular intervals.



Fig. 14: Plan of the floor and cattle pen of the last phase, Mahagara (*after* Sharma *et al*. 1980)

No structural features were reported from the Neolithic site of **Koldihwa**, since a very limited area was excavated. However, burnt clay pieces with wattle impressions were found in abundance, which indicates that the Neolithic people lived in thatched huts, with wooden posts and mud plastered screen walls. At the Neolithic site of Panchoh some circular and oval floors are reported.

The site of Koldihwa has yielded structural remains in the Chalcolithic levels. They consist of postholes encircling an oblong floor measuring 5.25 m and 3.20 m. The floor was rammed with burnt clay clods and earth. Besides, two mud walls were reported. At the Chalcolithic site of Khajuri the structural feature is represented by a floor made of rammed earth, burnt clay and potsherds. The floor is littered with pottery, animal bones, querns, mullers, stone pieces, burnt clay lumps with reed and bamboo impressions, and stone objects. A fireplace was reported on one of the floors.

In the Semi-permanent and Permanent settlements of the Musahars the floors are made of rammed earth. The Kols and Mallahs make floors, by filling earth and plastering it with cow dung and mud. This application of paste helps in the maintenance of the floor, which tends to crack due to constant use. The presence of material remains on the floor of the hut at Khajuri implies that the hut was used for keeping their important belongings. Besides, the fireplace possibly suggests a cooking area. At present the Kols and Mallahs use their single huts for keeping their belongings, cooking, sleeping and storage of grains. But among the Musahars, the hut is used mainly for keeping their important belongings and storage, while the cooking and sleeping are always outside the hut. It is only during rainy season that they use the huts for cooking and sleeping.

The existence of limited structural remains at the site of Sarai Nahar Rai indicates that probably it was a seasonal settlement where no permanent structures were erected. This is very similar to seasonal open-air settlements of the Musahars who generally take shelter under huge *Mahua* trees and very rarely make a small shelter to keep their belongings. At Chopani-Mando, the structures are circular and oval huts, constructed in a beehive fashion. Similar evidence is seen among the Musahar settlements, especially seasonal summer settlements. The huts of both Neolithic and Chalcolithic periods in the Belan valley have common features. Thus, it can be said that the Chalcolithic culture had strong roots in the Neolithic culture of the area. The hut varieties of the Semi-permanent and Permanent settlements of the simple communities are similar to those of the Neolithic and Chalcolithic huts.

Placement and types of hearth: The Mesolithic and Chalcolithic sites in the Ganga and Belan valleys have yielded different types of hearths, i.e. regular oval or circular hearths, single-mouthed hearths and pit hearths; some of them are plastered with clay.

The Mesolithic sites of Damdama and Mahadaha have yielded evidence of plastered oval and circular hearths. Such plastered hearths are still in use among the simple communities in the study area. At Sarai Nahar Rai, beside a community hearth eleven other hearths are reported out of which eight are excavated. Four of them were regular hearths of circular or oblong shape having varying sizes. Similar evidences come from the seasonal open-air settlements and seasonal summer settlements of the Musahars. Here the hearths are placed outside the floor area as no huts were observed other than a small shelter erected for keeping the belongings. The hearths are constructed as per requirement. The bigger regular 'U'- shaped mud or stone hearths are used for cooking and are regularly cleaned and mud paste is applied on them. The hearths used for a short period i.e. three-stone hearths, are meant only for roasting meat or for cooking during rainy season (fig. 15). When these hearths are abandoned, they are characterized by accumulation of ash, burnt twigs, clay lumps and discarded animal bones.



Fig. 15: U shaped brick hearth with bones of roasted animal

At archaeological sites the absence of charcoal signifies that only leaves, grasses and twigs were used as fuel. Presently, it was observed that in the

open hearths, large pieces of wood are generally reused whereas charcoal is carried away by the wind or used for cleaning utensils by the womenfolk.

The seasonal open-air settlement of the Musahars usually has three families but the settlement area has as many as three regular hearths, four or five roasting hearths and a few abandoned hearths. It is important to note here that a settlement comprising three families can have as many as 10 or more hearths, including regular, roasting and abandoned hearths at the same time. In the archaeological sites these account for the presence of a large number of hearths representing family units. However, from this study it was found that it is not tenable to infer that a hearth is a marker of a unit or family, when the hearths are found scattered all over the settlement with or without the floor context. Besides, the possibility to reconstruct the probable population at the site is not possible unless the hearth remains are found in the context of floor area.



Fig. 16: Single mouthed hearth of transitional phase, Khajuri (*after* Misra 2000)

It is to be noted that the Neolithic sites of Mahagara, Koldihwa and Panchoh in the Belan valley have not yielded any evidence of hearths, though in the Advanced Chalcolithic levels at Koldihwa, a single-mouthed *chulha* has been found. At Khajuri a floor has yielded a fireplace and an U-shaped *chulha* in the Transitional phase (fig. 16). Such U-shaped *chulhas* are still in use among the simple communities in the area (fig. 17).



Fig. 17: Single mouthed hearth (*chullah*) next to bin inside a Musahar hut

The Mesolithic sites of Sarai Nahar Rai**,** Mahadaha, Damdama and Chopani-Mando have yielded a number of pit hearths (fig. 18). These pit hearths are circular, oval or oblong in shape and measure 52 cm in width and 15 cm to 40 cm in depth, and some have a constricted base with a wide mouth. Some of them were plastered with wet clay. The pit hearths contained clay lumps, ash, and tiny charred animal bones. A gaur skull with horns was also found in a pit hearth at Mahadaha. Similar pit hearths are exclusively used by the Musahars and Kols for cooking, roasting meat and warming food (fig. 19). Due to close contact with regular hearth the pit hearths are found to contain a mixture of clay lumps, charred grains, semi charred animal bones and ash. This is because the burning fuel is often scooped out of the cooking hearth and smothered when the hearth is not in use and replaced when the hearth is being used.

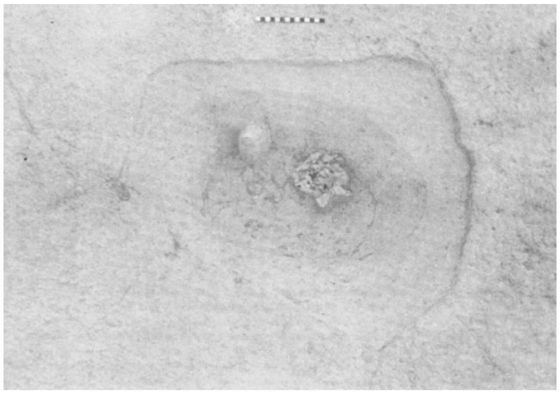


Fig. 18: Pit hearth at Sarai Nahar Rai



Fig. 19: Pit hearth (*Borsi*) used for boiling milk, cooking, warming food by a Kol women

The placement of hearths at Chopani-Mando is found outside the floor area. Among the Musahars and Kols the placement of the pit hearths is seen outside the hut in the open. The reason is that their cooking involves a lot of roasting of meat, which emits smoke and the smell of burning flesh. Thus, cooking is always carried out outside the hut area.

Storage Facilities: The Mesolithic site of Chopani-Mando from where the earliest hand made pottery has been recovered has also yielded a number of circular or oval structures made of flat slabs of various sizes. The maximum and minimum diameters of these structures are 70 cm and 30 cm respectively. Remains of burnt daub fragments with impressions of bamboo sticks lying around some of these circular/oval structures were obtained. The probable conclusion drawn was that these stone structures are the bases of storage bins made of bamboo and clay. The Kols and Musahars use several techniques for preserving and storing food for various lengths of time, both as a future reserve and for obtaining a desired flavour of the stored food. They store their grains in various types of containers like, clay storage bins, jars, pots, tin boxes and aluminium and steel trunks. The clay bins are found to be an inseparable part of their material culture. Stone slabs in the form of platforms are embedded in the ground so that the storage bins can be installed on them to dissuade rodents and pest attack from the bottom of the bin**.**

At Mahagara 49.06% of the pottery consists of storage jars. The storage vessels are more in comparison to cooking vessels, while dining vessels are moderate. At Neolithic levels of Koldihwa and Panchoh big storage jars have been found. Also noticed are appliqué decoration, consisting of chain and rope patterns, on the big jars and straight-sided troughs. The evidence of storage jars comes from the Chalcolithic sites of Koldihwa and Khajuri. In the transitional phase between Chalcolithic and Iron Age at Khajuri, the floor yielded a giant stone slab near the hearth. The slab was presumably used as a platform for storage bins or jars. Presently, storage bins among the simple communities are placed next to the hearth. A large number of circular stone discs stone recovered from Koldihwa were probably used as supports to place the storage jars.

Food production, even in its simplest form, provides an opportunity and a motive for the accumulation of a surplus as seen from Chopani-Mando. Unfired or lightly fired handmade containers of mud would have been useful for storing food grains. Containers or pots of clay are impervious to insects and rodents, and do not decay as do containers of perishable materials like hide, wood, bamboo or grass. Storage facilities of varied forms and sizes show that grains can be stored in bins in bulk. But for extraction of small quantities at regular intervals containers like smaller storage jars are more useful. The presence of unfired large storage jars in the early levels at Chopani-Mando is of key importance in understanding how prehistoric people in the gathering stage started making pottery first by hand and later by wheel. These containers may have been used for storing grains as well as processed or unprocessed food and water. The storage bins were substituted by the storage jars largely due to their sturdiness and durability. The existence of storage bins in the excavation along with other storage facilities indicates the importance of bins, for the storing of grains. They certainly played a crucial role in life of the people and are one of the important indicators of prosperity of settled agriculturists.

Pottery: While the Mesolithic sites in the Ganga valley have not yielded any evidence of pottery, the Mesolithic site of Chopani-Mando in the Belan valley has yielded evidence of the earliest hand made pottery. On the basis of ethnoarchaeological study it has been observed that no society living in a hunting-gathering stage generally make their own pottery. They obtain the pottery from neighbouring advanced societies. It can be inferred that in the distant past the Mesolithic people from the Belan valley used pottery by exchange from contemporary advanced societies. But as revealed by the type, technology, morphological shapes, decorative motifs and especially the size of the pots it is evident that the Mesolithic people of the Vindhyas made their own pottery (bowls, vases, dishes and bigger bowls) without any influence from any advanced contemporary culture. These vessels were mainly used during processing and consumption of food.

The Neolithic ceramic assemblage in the Belan valley was more advanced, matured and standardized, with functional pottery types like different types of bowls, jars, *handis*, basin, platter and small vases. This suggests that the late Mesolithic phase of the Vindhyas was in transition from the Mesolithic to the Neolithic culture. The pottery traits of the Neolithic survived into the Chalcolithic phase of the Belan valley. The Chalcolithic pottery included the functional types like different types of bowls, bowls-cum-lids, dish-on-stand, footed basins, tumblers, vases, *handi*, jars, beakers, dishes, and miniature vessels. At present the Musahars, Kols and Mallahs use pots mainly for storage purposes and cooking and storage is done in aluminium and steel utensils.

Disposal of food refuses: The Mesolithic inhabitants of Mahadaha disposed of their food refuse in the hearths, in the habitation area and in the adjoining lake. Whereas at Sarai Nahar Rai, Damdama and Chopani-Mando food refuse was disposed off in hearths and pit hearths. The disposal pattern of food refuse in the Musahar, Kol and Mallah settlements are similar.

Mode of Disposal of Dead: The Mesolithic sites of Ganga valley have yielded graves and skeletons from Sarai Nahar Rai (12 graves/ 15 skeletons), Mahadaha (28 graves/ 32 skeletons), and Damdama (41 graves/ 48 skeletons). But no evidence of disposal of the dead comes from the Mesolithic, Neolithic and Chalcolithic sites of the Belan valley.

The graves of the Mesolithic period were carefully prepared by being provided with a 3-4 cm thick, cushion of soft soil. They were shallow and oblong and the dead were placed in an extended and supine position in east-west or west-east orientation. In a few cases one hand was lying by the side of the body and the other was placed across the abdomen. The Kols and Mallahs bury only their children. But Musahars bury their children and in few cases the parents about a few meters away from the settlement. For example in the Seasonal open-air settlements the burial ground is 7 m away from the dwelling area generally near the water source in Shankargarh village. Among the Musahars and Kols the grave is dug in a north-south line. They are shallow and measure 1 to 1.50 m in length and 0.50 to 0.70 m in depth. The head is placed towards the north; the body then is covered with a white cloth. The layers of mud, thorns and again mud are put over on the dead body. A small tumulus is made on which large round stones and thorny bushes are placed to protect the dead body from scavengers. Sometimes such burials are placed very near to the river section or inside the section, so when the water level rises, the flowing stream carries away the dead body.

At Mahadaha, 35 hearths were found in the cemetery-cum-habitation area. The burial grounds of the Musahars are very near (7 to 20 m) to the dwelling area (fig. 14). In many cases the author was told that in the recent past they used to bury their dead in the settlement itself. The parents were buried usually just outside the hut, as they were thought to protect the family from evil spirits. Besides, they strongly believe in ancestor worship. The probable explanation for the Mesolithic inhabitants burying their dead in the settlement itself might have something to do with ancestor worship. And burial within the settlement also prevents attacks by scavengers, as the graves are shallow. As mentioned earlier, the placement of the hearths among the Musahars is always outside the hut. If the dead were also buried outside the hut, then the grave is bound to have hearth and hearth refuse material in it.

At Sarai Nahar Rai in Grave no. VII, four individuals were buried. Two of these skeletons belong to males, and two to females. Males were

placed to the right of the females. In the burial of the Musahars, the head is placed towards the north. If the deceased was a man, the body is placed on the right side of the grave, if a woman, to the left. The explanation for placing the dead body in this fashion is that the man and woman were originally a single body. The right or the stronger half belongs to the male and the left or the weaker half to the female. When the two halves split, each becomes a whole and perfect body, one a complete man and the other a complete woman.

The graves at Sarai Nahar Rai, Mahadaha, and Damdama have yielded grave goods like bone arrowheads, microliths, and ground pieces of haematite. The occurrence of burnt clay lumps and charred animal bones in the graves suggests use of hearth refuse in filling the graves. The Mesolithic burials of the Ganga valley have yielded evidence of ornaments in the form of rings, earrings and necklace made of antlers (e.g. at Mahadaha from grave no. IV, V and VII) and pendants (in Grave no. VII, Damdama). Among the Musahars, burials do not contain any grave goods, but belongings are placed around the stone tumulus of the dead. Ornaments of precious metals like gold and silver are removed and replaced with those of cheaper materials like lead and aluminium before burying the dead. At Damdama grave no. VII has yielded a male buried with a pendant. The male members of the simple communities adorn themselves with a few ornaments like pendants and rings. Thus, the grave goods do not always imply a belief that they were needed by the deceased in the after life, but because the use of things of the dead by the living is not considered auspicious and thus they are discarded.

The evidence of double burial probably had some social significance for the Mesolithic people. Maybe this symbolised a marital relationship. At Mahadaha two double burials have been reported in grave nos. I/XIV and V/X. In one of the graves (XIV) the burial is of young male and female. Such evidence also comes from the site of Damdama, which has yielded 5 double burials and one triple burial. Grave no. XX has an adult male and a young adult female, while in grave no. XXXVI the male is a young adult and the female an adult. The triple burial included two male adults and one female adult. Thus, it can be said that they practised both monogamy and polyandry.

The placement of burials in the Mesolithic settlements might have been guided by following reasons:

- They worshiped their dead as the Musahars do today.
- Belief that the dead ancestors' spirits protects them form evil spirits, as such beliefs are still prevalent among the Musahars.
- Belief in life after death, for which the dead were buried beside the hearth in the belief that the hearths would provide energy to the souls of the dead.
- Burial within the settlement would have prevented attack by scavengers.

Evidence of burial does not come from the Belan valley sites. Probably they buried their dead in river sections, and when the water level rose, the river carried the dead along. Such mode of burials is seen in the Seasonal and Semi-Permanent Settlements of the Musahars.

Subsistence Pattern: The Musahars and Kols are hunter-gatherers and agriculturist and the Mallahs are fishermen and agriculturists. Due to the rapid destruction of forests big game hunting is done very rarely and is illegal as well. However, the tradition of small game hunting though of little economic importance is still practised among these communities.

Small game hunting: The Musahars prefer small game hunting to big game hunting, as it requires less energy and tools. They are very much aware of the consequences of excessive hunting and therefore regulate their hunting thus maintaining an ecological balance. The Mesolithic people may have also been well acquainted with how many animals had to be exploited, which invariably left them with the option of exploring new food resources from time to time. But it is interesting that the animal bones are seen either in less or more percentage from all the layers from Damdama probably because the Mesolithic people were experimenting with the choice of game to be hunted and amid the scarcity of stone tools. This might be the reason why every second bone in Damdama was a worked bone, if not a well-made tool.

The evidence of dog in Mesolithic levels at Sarai Nahar Rai and Damdama is intriguing. The Mesolithic inhabitants were in close contact with dogs that ultimately lived on the bones thrown to

them and then gradually got domesticated and accompanied them during hunting expeditions. Domestication of dogs is also common among the simple communities who keep them for hunting and for protection against intruders.

The small game hunted by the Musahars mainly consists of rats and squirrels. The faunal assemblage of Mesolithic sites of Mahadaha and Damdama includes the bones of rodent species like *Rattus rattus* and *Bandicota indica*. The Chalcolithic site of Khajuri has also yielded evidence of rodents.

It was observed that a single tool i.e. *khanta* and a bucket of water is enough to catch as many as 5 or 15 rats at a time. Roasting of rats is always carried out on open fires and rarely in regular hearths. The processing does not require any tool and rodents tooth is enough to dissect it. Dried twigs and leaves are used as fuel wood for roasting. The roasting area after 10 days has remains of ash and teeth of the rodents as every other part of the animal is consumed. In addition, rats collect grains in their holes during harvest, which is collected from their nest by the Musahars after killing the rats. It is probable that the Mesolithic inhabitants of the Ganga valley also initially came in contact with wild grains while clearing rat holes and this may have ultimately led them to collect these wildly growing grains.

The faunal assemblage of Damdama has yielded evidence of porcupine. The Musahars and Kols of the study area also hunt porcupines. The porcupine is roasted after removing its quills. The roasting is done in the hearth or on open fire. Only the quills, viscera and burnt twigs remain at the site, which is later blown away by wind. Besides, domesticated animals like pig are also roasted in open hearths on twigs and straw.

Fowling: The faunal assemblage of Mahadaha and Damdama has yielded evidence of the bird *Gallus gallus* (8.96% of the total assemblage). The Musahars and Mallahs also catch birds for consumption. The whole body is consumed leaving behind feathers and beaks of the birds in the open or in a regular hearth.

Summary: Small mammals like rodents do represent a potentially rich food source. But how much each species contributed to the diet of the Mesolithic people is difficult to evaluate from the meagre amount of remains recovered. Despite dietary potential afforded by small mammals, they are generally assigned minor significance and are constantly overshadowed by larger animals in archaeological interpretation. The importance of small animals in the prehistoric diet can very well be seen from the Mesolithic sites of the Ganga valley. Since every part of the small animals is consumed it is unlikely that any traces of the same can be found in the archaeological record. Though limited number of bones of small animals in the archaeological record contribute to our knowledge of the types of species exploited by the prehistoric people, it is difficult to estimate the contribution of individual species. Studies show that small animals have relatively high edible meat to live weight ratio. Thus these small animal remains can be an important source for reconstructing prehistoric diet. The hunting of small game requires fewer tools, which would have been important when the raw material was scarce, the nearest source being 100 km from the sites.

The Musahars hunting style sets them apart from other hunters since they use only minimum equipment for hunting operations. The evidence of small game hunting is very well depicted in the rock paintings of early hunters and gatherers at Jaora near Bhimbetka in Madhya Pradesh. An elaborate scene of several women cooperating in catching rats from their burrow is depicted at Jaora (Neumayer 1993: 78). The other depiction shows rats being carried by the hunters on their back. The use of sticks for digging is interesting because this technique survives among the Musahars. Although there was no scarcity of big animals in prehistoric times, the rats still constituted a part of prehistoric diet.

Fishing: The faunal assemblages of the Mesolithic site of the Ganga valley and Neolithic and Chalcolithic sites in the Belan valley has yielded remains of aquatic animals like tortoise (*Lissemys punctata* and *Chitra indica*) and fish remains. Majority of the bone fragments reported at Damdama were tiny (1 to 3 cm in length) and 90% of the total assemblage of them were charred, suggesting that roasting of meat was the main mode of cooking. At Sarai Nahar Rai bones recovered from the hearths were in different stages of roasting with extensive soot on them. The dorsal plates and shells of tortoise found from hearths also showed signs of roasting.

The ethnographic study helped in understanding the importance of fish in the subsistence of the past communities:

- Fishing practices develop as a local response to the geography and distribution of fish. Though fishing is done throughout the year, the main fishing season is during rains and summer in rivers and lakes.
- Fish remains at the site if analysed can show distribution of species, provide information about the climate, the seasons in which they were caught, food preferences and the fishing methods.
- The fish remains found at an archaeological site, or the reconstructed death assemblage may not always shows the extent of fishing activity carried out on the site, because:
  a. Fish hunted from the river and lakes are deposited in various places in different settlements. Different types of processing and butchery methods employed lead to different locations for deposition of fish bones. For e.g. the Mallahs do not carry the complete fish back to the settlement as they are already carrying considerable weight. The heads and fins are discarded at the bank of the river. Non-edible fish are left behind at the riverbanks and only the important fish stock is bought back to the settlement. Fish hunted by children are processed and discarded along the river or on the lakeside, paddy field or elsewhere. Thus, bones of a number of species consumed cannot always be found in the dwelling area but are found near the actual fishing area.
  b. It is necessary to excavate both the fishing area (where generally butchering happens) as well as the dwelling area (disposal of bone) for better understanding the fishing activities if the archaeological site is situated along the river or lake.
  c. During extraction of oil most of the discarded body parts (tails, fins, and bones) are utilised, leaving the crushed remains behind. Thus, it very unlikely that any traces of such processing will be seen in the archaeological record.

Summary: The Mallahs are specialized fishermen. Their temporary settlements (Settlement Type I) are seasonal in character and reflect successful food acquisition. Some of the Mesolithic, Neolithic and Chalcolithic communities must have achieved similar efficiency in fishing.

While interpreting any archaeological site it is very important to note the context in which the animal bones are found. The disposal of fish bones in the Mallah settlements is in: hearth area, dump behind the hut or scattered near the settlement, agricultural fields and on the riverbanks. Considering the habits and ecology of the various species recovered, it is possible to reconstruct the sources likely to have been exploited by ancient man. Thus, the fishing methodology adopted by present day simple communities shows many similarities with the prehistoric practices. Bone hooks may have been used, but only limited evidence has come to light during excavation. There is no direct evidence for the use of nets or traps, but small fish could have been collected with the help of cover baskets or by hand.

Fishing by hand and with sticks is the simplest fishing technique among the Musahars and the Mallahs, where there is a minimal use of tools. The raw materials used for making fishing tools and traps are locally available. Much of it consists of bamboo, which is easily obtained from the nearby forest, while cotton and nylon strings for weaving nets, iron hooks and net sinkers are obtained from local markets.

With the lack of substantial evidence for a link between life in the modern era and that of the prehistoric past, it may well be asked whether the stone-tool using people possessed the technological skill of fishing which is known to the contemporary fishing communities. The Mallahs, Musahars and Kols all carry out fishing. They employ varied fishing techniques, which are similar to those found depicted in the rock art in the nearby area. With the lack of substantial evidence for a link between life in the modern era and that of the prehistoric period, it may be asked whether the stone-tool using men were acquainted with fishing. The evidence of fishing is very well depicted in rock paintings of hunter-gatherers at Lakhajoar near Bhimbetka, district Raisen in Madhya Pradesh (Neumayer 1993: 78-79), a detailed fishing scene depicts people catching fish from a small pond or waterhole. A person’s pouch is hanging from the branch of a tree, a hand net is placed at the ground to allow its owner to catch a turtle with both hands. Another person has strung several fish on to a rod for easy transport. Others are fishing by nets and by bow and arrow. At one side fish are stacked according to their variety. Rock paintings at Kerwaghat, Kowar Khoh and Gojara, District

Mirzapur in Uttar Pradesh depict fishing scenes (Neumayer 1993: 108, 112,113). Here fishing is done by boats, generally manned by two persons, one at the stern handling the paddle, the other spearing fish or turtles. These paintings show that the fishing techniques used several thousand years ago were not much different from those of today.

Gathering: From the Mesolithic site of Chopani Mando and Damdama charcoal remains of bamboo, charred grains of millets, and wild rice have been reported. This shows that the prehistoric people gathered these grains. The evidence of seeds of wild plants from the Mesolithic site of Damdama in the Ganga valley is interesting as:

1. *Bathua* (*Chenopodium album* L**.**) is eaten as vegetable and Musahars and Kols use the seeds for its anthelmintic proprieties.
2. *Kher* (*Heteropogon contortus* L.) is used as fodder for cattle by the Kols.
3. *Ber* (*Zizyphus jujuba* Lam.) is eaten as a fruit, and the Musahars and Kols use the seeds as a cure for diarrhoea and abdominal pain.

At the Neolithic site of Mahagara impression of bamboo in clay lumps has been found, which was probably used for construction of huts. Bamboo was also used as fuel as is evident from the charcoal from the site. Besides, the Neolithic inhabitants also gathered wild rice. From Neolithic levels at Koldihwa seeds of jujube (*ber*) are reported.

Due to the perishable nature of plants they are rarely encountered during excavations. Ethnobotanical observations among the Musahars and Kols show that these groups are still greatly dependent on forest resources both for food and medicines.

Agriculture: At the Neolithic sites of Mahagara and Koldihwa remains of wild, cultivated and hybrid (between wild and cultivated) grains have been reported. In the Chalcolithic levels at Koldihwa and Khajuri, evidence of cultivated rice and of cultivated wheat and *moong* from the last phase at Koldihwa is reported. Presence of querns, mullers and rubber stones comes form the Mesolithic sites of Chopani Mando, Mahadaha and Damdama, Neolithic sites of Mahagara and Koldihwa and Chalcolithic sites of Koldihwa and Khajuri. Querns and mullers are also presently used among the simple communities for grinding not only cereals but also a variety of seeds. Besides, evidence of storage jars indirectly indicates the production and storage of grains on the analogy of the practices of the simple communities. The most interesting feature is the use of rotating quern made of mud and clay by Kols and Musahars. This type of quern is used only for dehusking the grains, mainly paddy i.e. *dhan*. Thus, for dehusking, the rotating quern made of stone i.e. *chakki* is not required. The Mesolithic people may have also constructed a similar device without any of use of stone.

The flood plain of the river adjacent to Koldihwa was most suited for the cultivation of rice, which could be exploited without the aid of any man made irrigational device and extra manuring. Ploughing tools are not always necessary to grow rice in flood plains as is evident from the current practice of rice-cultivation in flood plains of the region.

The Mallahs in their Seasonal agricultural settlements, hilltop (Settlement Type II a) carry out agriculture on a seasonal basis on the hills in the Belan valley. Most of the explored Neolithic and Chalcolithic sites are found in the nearby hills of the Belan valley. It was observed that a group of Mallah families seasonally come to inhabit these hills during summer. The area chosen for agriculture is on the top of the hill a few meters away from the river. They cultivate this land and carry out fishing simultaneously. They occupy the same huts on the hills seasonally by renovating them. The summer hill top settlements are found on both sides of the river. A few Mallah families come form the Mando village where they have permanent settlements (Settlement Type III) and others come from as far as the foothills of Kaimur to do agriculture in this fertile area. The Mando village during rainy season is completely isolated and becomes an island as the Belan river flowing around rises up and detaches the connection to the land.

Most of the agricultural tools used by the simple communities are made of wood. For example, a small piece of iron in the plough is enough to cultivate the fertile area on the hill. A dibbler in the form of microlithic points might have been an effective tool for making holes for sowing grains. Reaping also could have been easily carried out by sickles hafted with microliths.

Archaeological evidences show that the Neolithic inhabitants in the Belan valleys carried out hunting-gathering and agricultural activities. Though no Neolithic site has been excavated in the Ganga plains in the study area, it could be inferred from the present simple communities that the Neolithic and Chalcolithic inhabitants might have had an effective agriculture-based economy in this region which is more fertile than in the Belan valley.

Technology: Tools play a vital role in the economic pursuits of hunting, gathering, fishing, and agriculture. Today the simple communities do not use stone for making tools. Instead, they use wood, bamboo and iron, which is much more effective and durable than stone. Bamboo and wood are secondary raw materials, and are mainly used as shafts and handles.

The main multipurpose tool of the Musahars is *khanta*. The flat iron of *khanta* looks similar to stone tool chisel with sharp cutting edge, which occurs at the Neolithic site of Mahagara in the Belan valley. This tool is also used by the Mallahs and is known as *ramma*. It was observed that four families of Musahars could effectively use a single *khanta* for collecting leaves, digging roots, cutting wood, hunting rats, and digging holes for dwellings. The Musahars also use another iron digging tool i.e. *gahdala* which is similar to *khanta* but is not hafted to bamboo. Among the Kols this tool is known as *faar.*

The Kols use three types of hunting tools i.e. *gadasa*, *barcha* (spear) and *aksi* (barbed spear). All these tools are made of iron and hafted to bamboo. The *gadasa* is used mainly for cutting the head or legs of the running animal. The *barcha* and *aksi* are thrown at animals like wild boar, deer and birds like peacock.

The Mallahs have varied types of fishing tools according to their functional implications and materials used have been discussed in Chapter 6 of the thesis. The ones made with iron are *katia* (hooks), *katia jor* (baited pole), and *ballum* or *pachki* (pronged spear). They also do effective fishing without use of iron tools. They also make use of organic materials for fishing. The earliest tools for fishing probably were sticks, and thorn hooks. The Mallahs make cover baskets (*like tap**,** chhaup or kurimar**,** ganja*)*,* screens (*chilwan**,** chinta),* and *barra* from organic materials like bamboo, hemp, and *nurkul*. In earlier days they used hemp, silk thread for the weaving of nets but at present they use nylon thread, cotton and hemp for making nets (*bhawar jal, maha/ kurail/ santa/ ber jal, bisri or chhot-ber jal* and *fasila jal*).

The iron tools hafted in bamboo and used in agriculture are discussed in Chapter 6. They are *hal* (plough), *hansiya* (sickle), *khurpi* (hoe), *gadasa* (chopper), *pharua* (spade), and *kulhari*/*tengari* (axe). Sickles made up of microliths might have served the function of cutting during in Neolithic and Chalcolithic periods. Tools for agricultural work are also made entirely of wood and bamboo, for example *pata*/*patella* (clod-crusher/leveler), *moosal* (pounder), *supa* (winnowing basket), *jowatha* (harness), and *dheki* (husking device).

For basket making iron tools and their materials are discussed in Chapter 6. They are *banka* (long knife), *banki* (small knife), *hathauri* (hammer), *chaku* (picking knife), *suja* (bodkin), *kainchi* (scissors), *katarni* (side cutters), *jamboor* (round-nosed pliers) and *plas* (pliers). The tool of organic materials used in basket making is *pichari.* An oilstone or a stone sharpener is necessary to keep the knives sharp. Sharpeners of stone are reported from Mahadaha, Mahagara, and Koldihwa. While gathering wild plants from the forest they employ tools made of organic material like *laggi*, *khara*, *khonch* and *baiyya* besides *khanta*, which they always carry along with them.

The Mesolithic, Neolithic and Chalcolithic sites of the Ganga and Belan valleys have yielded a variety of blades and hammer stones. It was observed that while making baskets the use of knife and hammer stone is of major importance. Thus, it can be said that the blades and hammer stone used by prehistoric people may have been for basket making also.

Discussion

The study reveals that many cultural aspects of the prehistoric culture of the Ganga and Belan valleys still survive in the communities living in the vicinity of ancient sites. Hence ethnographic analogies prove to be of great help in explaining the evidence from archaeological sites.

The Mesolithic settlements were located near two types of water sources:

a. River valleys (9 sites)
b. Horseshoe lake (179 sites)

The reason for the occurrence of very few sites along riverbanks is not clear. Presumably the Mesolithic people settled on the sandy patches of the receding rivers like the Ganga and the Tons and rarely settled along the riverbanks. A possible reason for this might be the thick vegetation, which due to limited availability of raw material couldn't be cleared by microlithic tools and inhabited colonization. The vast sandy patches, devoid of vegetation, were ideal for habitation. No habitational evidence can be found on the sandy patches as the flowing river during rainy season inundates them and destroys all evidence. The Mallahs in Seasonal Agricultural Settlements (Type II b) have settlements on the sandy plain of the receded Ganga, which they occupy during summer for agricultural purposes and also for fishing. The traces of this type of settlements are washed away during the rainy season by the floodwaters and new settlements (Type II b) are made every year.

If they choose to stay close to the riverbank, the floods and shifting of river course carry away the archaeological remains. It is interesting to mention here that the Mallahs do not settle close to, the riverbank because of the threat posed by floods. They establish their permanent settlements (Type III) about a kilometre away form the river. It is only in Temporary fishing settlement (Type I) that they occupy an area close to the banks during fishing seasons. Because of the movement of fish the Mallahs do not tie themselves to any particular place for a long time. They are always on the move and the location of the settlement is mainly determined by the availability of fish. Temporary thatched huts are constructed with bamboo or wood with two-sloped roofs made of hay and branches, which can easily be removed whenever necessary. These temporary settlements are usually destroyed during floods, thereby wiping out all evidence of occupation.

The selection of the Mesolithic settlements in the study area on the lakeside was guided by consideration of assured supply of:

- Water
- Aquatic food resources
- Opportunity to hunt large and small animals which come to the lake for drinking water
- Availability of wild edible plants food in the vicinity of the lake.

The Early Mesolithic sites in the Ganga valley are devoid of habitational deposits. The tools of the Early Mesolithic are smaller in comparison to the Epi-Palaeolithic tools. The chert of the Belan valley is primarily grey in colour. Majority of the Mesolithic sites in the Ganga valley yielded artefacts of this raw material. The appearance of grey colour chert indicates a considerable expansion of population from the Belan valley, who carried this raw material for making microliths from time to time. The tools of Epi-Palaeolithic period are bigger in size in comparisons to those of the succeeding Mesolithic period in the Ganga valley. Besides, the tools of the Ganga valley are smaller than those of the Belan valley in size in all the phases. The lack of raw material in the Gangetic plain is the possible reason for the exhaustive use of the cores, the nearest source being 100 km away from the Ganga valley.

It is important to mention here that due to the non availability of stone making tools the Mesolithic inhabitants of the Ganga valley adopted, other available raw materials i.e. bone, antler and horn. The bone and antler tools from the sites include arrowheads, points, blades, knives, chisels, axes, scrapers, saws, pokers, daggers and cutting lancets. Besides, a few horn cores of sheep and goat and antlers were probably used for digging purposes. Worked bones were found in abundance at Damdama. On the other hand, bone tools are absent in the Mesolithic sites of the Belan valley, obviously due to easy availability of stone.

What led the prehistoric inhabitants of the Belan valley to migrate to the Ganga valley and what possible routes did they adopt for their migration? The reason for migration might be the growth of population and scarcity of water and food, which led them to migrate to new lands, which provided them with rich wild flora and fauna.

The Belan river was probably the route taken by the Epi-Palaeolithic and Mesolithic people. It joins the Tons, which ultimately joins with the Ganga. In the past the Ganga valley must have been a vast stretch of forestland with abundant wild fauna. To cross these forests through main land would have been difficult for the Epi-Palaeolithic and Mesolithic migrants. Probably due to this reason, these groups moved along the rivulets and streams on whose sandy beds the forest cover was thinner than on the main land. The best season for their movement would have been summer, when the

water level is low and when they can easily occupy the sandy patches of the receded rivers, which were devoid of thick vegetation.

Once they reached the Ganga they would have occupied its banks. How did the prehistoric people cross such a mighty river without the aid of boats? The only suitable season for crossing the river was summer when the water recedes and exposes the riverbed that is a vast sandy patch. At the time of crossing the receded Ganga, some of them probably settled down on its banks and a few others moved along and crossed the river in search of better food resources. Presently, the Mallahs settle (Type IIb) in the receded Ganga for cultivation of vegetable and fruit crops and for fishing. These settlements do not leave any traces of habitation as the water during rainy season carries away the material remains. The Prehistoric people must have also occupied the land along the banks of the river in the same way. However, large urban and agricultural settlements along and near the river have probably destroyed the evidence of the possible prehistoric sites.

The Mesolithic people came in small groups to the Ganga valley and settled on alluvial plains with their rich flora and fauna. A few groups started exploring new locales, and inhabited the area near the horseshoe lakes, which provided them plentiful aquatic foods. Stone for making tools being absent in the Ganga plains had to be imported from the Vindhyas and was therefore a valuable resource. Exploitation of aquatic animals would have been the easiest source of subsistence, as it didn't require many tools and could be effectively accomplished by hands and sticks. As the population grew, they moved on to other horseshoe lakes.

The Belan valley Mesolithic site is characterised by pottery, which is absent in the Ganga Valley. From this it can be inferred that the migration took place in the pre-pottery phase of Mesolithic culture and probably stopped before the introduction of pottery. And if the Mesolithic inhabitants of the Ganga continued to come to Vindhyas for raw material or seasonally migrated then why did they not adopt the practice of pottery making. This fact suggests that due to the innovative use of bone for tool manufacture, migration of the Mesolithic people to the Ganga valley had reduced. Thus, due to limited interaction between the Mesolithic cultures of the Ganga and Belan valleys two important aspects i.e. bone industry and ceramic industry were not shared.

The subsistence of the Mesolithic people of the Ganga and Belan valleys was based on hunting, gathering, fishing and fowling. The animal bones recovered from the Mesolithic sites throw light on the economy of the people. The Ganga valley is rich in natural food resources required for a hunting–gathering way of life. Simple communities like the Musahars, Kols and Mallahs occupy the same areas, which were occupied by the prehistoric people. For their subsistence they do hunting, fishing, fowling, gathering and agriculture (Ansari 1999-2000: 142-149, 2001: 39-35). Their settlements are of varied types and conditioned by topography and the availability of water and cultivable land. Today simple communities mainly inhabit the southern part of the Ganga plain, which ideally suits their mode of settlement and subsistence.

The time span of the Mesolithic culture of the Ganga and Belan valleys according to C-14 dates and typo-technological consideration can be tentatively assigned to c. 8000–2000 B.C. The evidences suggests that the Mesolithic settlements of Chopani-Mando in Early Mesolithic (Phase II A) and Late Mesolithic (Phase II B) phase was seasonal and semi-permanent in Advanced Mesolithic (Phase III). The site of Sarai Nahar Rai was seasonal, while Mahadaha and Damdama were semi-permanent settlements.

No Neolithic sites in the study area have so far been discovered from the Pratapgarh district. The probable cause could be that such sites were located on the alluvial plains and have been destroyed by extensive agriculture. In the Belan valley evidence of the Neolithic and Chalcolithic levels cultures are known from Mahagara, Koldihwa and Panchoh. The Neolithic sites found in the Belan valley were located on both sides of the Belan river and its tributaries like Seoti, Tundiari and Gorma.

The Neolithic settlement in the Belan valley was planned according to the demand of the new economy. They subsisted by livestock raising, selective hunting, gathering, fishing and farming. Huts were constructed for dwelling as well as for the shelter of their livestock. The settlement was enclosed by a natural bund, which offered protection from wind. The Neolithic inhabitants chose natural hill barriers, as no other place could

have been better suited as a vantage point. Besides, their cattle and crops would have been well-protected form other incoming grazers, agriculturists and wild animals. The Neolithic sites are situated close to flood plains, which were suitable for cultivation of rice. The Neolithic sites of the Belan valley on the basis of C-14 and TL dates can be assigned between *c*. 5000 to 1500 BC. The evidences suggest that the nature of settlements of Neolithic sites of Mahagara, Koldihwa and Panchoh was semi-permanent to permanent in nature.

The Chalcolithic sites have been reported from the Ganga and Belan valleys. All the sites are riverine sites. They are situated on higher *bhangar* land, above flood level and terraces. The choices of location of settlements are mainly determined by the availability of fertile land for cultivation and pastureland. The flood plains and abandoned hill terraces were well suited for the cultivation of cereals like rice without any aid of irrigation and manuring.

In Seasonal Agriculture Settlement the Mallahs inhabit the hilltop terraces. These settlements are 1-2 km from the Neolithic and Chalcolithic sites. The permanent settlements of the Mallah are located on the either side of the Belan river. They cross the river to do farming on the hilltops. During their stay they make seasonal huts, which are abandoned and reoccupied. Besides other simple communities come from adjoining districts of Madhya Pradesh to cultivate crops on the adjoining hill terraces during summer. These settlements are similar to the Mallah settlement II a. When they reoccupy the site they utilise remains of abandoned huts for building new huts and use abandoned items like querns and mullers. This might be the reason why Neolithic ground stone tools like small celts were found from the Chalcolithic levels in the Belan valley. Probably Chalcolithic settlements were both permanent and seasonal types and they flourished side by side. Presumably the small settlements were seasonal in nature and were specialized in farming while the Chalcolithic inhabitants of permanent settlements were specialised in farming as well as livestock raising.

The Chalcolithic sites of the Belan valley on the basis of C-14 dates can be assigned to *c*. 1800 to 700 B.C. The evidences suggest that the Chalcolithic settlements were of a permanent nature.

To conclude there are some aspects, which require further investigation for better understanding of the prehistoric settlement patterns of the South-Central Ganga valley.

- Exploration along the river Tons for understanding the possible route of migration of the Epi-Palaeolithic and Mesolithic people.
- Exploration in the Ganga valley for Neolithic sites.
- Studies of more abandoned settlements of the simple communities for a better understanding of post-depositional processes, which determine the nature of preservation of material remains.
- Detailed ethnographic recording of seasonally migrating simple communities and the route of migration.

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Evolution of Society and Culture of Orissa- Based on a Synthesis of Archaeological, Historical, Linguistic and Anthropological Data

Tama Panda Roy

The social and cultural composition of our country shows a bewildering diversity in its component elements. The state of Orissa reflects this diversity as much as any other State or region of the country. But in spite of this basic similarity, Orissan society and culture present a distinctive regional character, which is different from that of the other parts of the subcontinent. Moreover, within the boundary of the State itself, its socio-cultural pattern differs from one region to other. This diversity is a product of geographic variation as also of history. Since history extends back in time to the Prehistoric times, archaeological evidence too is an important source of explaining and understanding this diversity. The other sources are ethnographic, biological and linguistic. There are a number of ethnic groups, religions, languages and dialects in contemporary Orissa. All these have roots far back in time. Within any cultural region, the ethnic mix, in terms of *jatis* or castes; (endogamous groups into which Hindus are born); tribes and other ethnic groups represented and their respective numerical, political and economic power, social hierarchy and ritual ascendancy provides an essential key to understanding cultural history and contemporary social dynamics. Analysis and interpretation of the ethnic groups of the study region are thus essential, and will provide considerable insight into the historical process that shaped the contemporary society and culture.

In the present study, therefore, an attempt has been made to trace the socio-cultural evolution in a part of Orissa as manifested in the contemporary social dynamics and cultural composition of the region. The geographical focus of the present work is on two coastal (undivided) districts of Puri and Ganjam, and the Sambalpur district in the hilly uplands of Orissa. This area has been chosen for research to show the regional variations between the hills and the plains of the State in terms of socio-cultural development.

Castes and aboriginal communities are the two social formations which encompass all the ethnic groups in Orissa. The Scheduled Caste (SC) and Scheduled Tribe (ST) populations of this State constitute 16.20% and 22.21% of the total population respectively. In this study region, maximum concentration of SC and ST populations has been reported from the Sambalpur district (SC - 17.48%, ST - 27.45%) followed by Ganjam (SC - 16.59%, ST - 9.40%) and Puri (SC - 15.45%, ST - 3.55%) (Census of India 1991). Caste groups are traditionally divided into four major divisions mainly on the basis of their occupation and ritual purity, viz. Brahmin; Kshatriya, Khandayat and Karan/Kayastha; Vaishya; Sudra. The Sudras again have two divisions, viz., clean Sudras and unclean Sudras (Untouchable castes).

Physical anthropological data on the ethnic groups of the study region show there is no marked biological difference among the twice-born castes (Panda 2003). They, in general, also do not differ in any significant sense from majority of the Sudra communities. However, some of the Sudra communities show close relationship with the Scheduled Tribes and the Scheduled Castes as well. Scheduled Tribes and Scheduled Castes on the other hand are close to each other. This pattern of biological relationship between the communities of the study region has also been corroborated by their cultural features (Panda 2003). In general, the twice born castes present a homogeneous group in terms of cultural features. Some of the Sudra communities can also be grouped into this category. The Scheduled castes and Scheduled Tribes together with some Sudra communities, in general, present another homogenous group. However, it is needless to say that each of these categories of Sudras, Scheduled Castes and Scheduled Tribes have three hierarchical stages within themselves on the basis of their closeness to higher castes in terms of occupation and other cultural features.

The unique feature of the communities of the study region is the occurrence of aboriginal cultural traits in all segments of the society. The preponderance of these traits decreases from the lowest to the highest hierarchical order. Many of the Sudra communities like some of the Scheduled Castes and Scheduled Tribes follow one or the other aboriginal practices like burial of the dead, bride price, marriage by courtship/elopement/intrusion/service, widow marriage, no restrictions on divorce or remarriage and women's equality in economic pursuit. Moreover one or two sections of the twice-born castes even among the Brahmins follow one

or the other such practice. But the most interesting characteristic feature in all segments of the society is the use of totemic gotra/clan name. Almost all the Sudras, Scheduled Castes and Scheduled Tribes have number of totemic gotra/clan names. Many of them, however, have only one clan which is very often *Naga/Nagesha*. Anthropologists like Singh (1998) says members of a gotra or clan are bound by the ties of a common ancestry. Gotra or clan exogamy is thus the norm in majority of the communities. But the communities which have only one gotra/clan practise gotra/clan endogamy. The concept of 'gotra' is probably a recent adoption by them and thus the notion of gotra is loosely practised. He further reports that the phenomenon of single gotra/clan is marked in the lower caste people in India. Totemic gotra/clan names can also be found among the twice-born castes of the study region, even among the Brahmin, but in lesser number.

These characteristic features of the ethnic groups of the study region strongly support the hypothesis that communities with the totemic clan names or still retaining aboriginal cultural features originally were members of the aboriginal society and were subsequently incorporated into the caste hierarchy. Since these features are preponderant among the Scheduled Castes and Sudra Castes it won't be wrong to suggest that the process of incorporation was active from below to above. This hypothesis is further reinforced by the biological data.

Table 1 Population of Scheduled Caste (SC) and Scheduled Tribes (ST) in the study region and their proportion to the total popuation in Rural and Urban Areas (1991 Census Report)

State/District		**Total Population**	**SC Population No.**	**%**	**ST Population No.**	**%**
Orissa	**T**	31659736	5129314	16.20	7032214	22.21
	R	27424753	4578669	16.70	6670506	24.32
	U	4234983	550645	13.00	361708	8.54
Sambalpur District	**T**	2697153	524085	17.48	740323	27.45
	R	2234545	463451	17.62	679930	30.43
	U	426608	60634	16.79	60393	13.05
Ganjam District	**T**	3158764	524085	16.59	296845	9.40
	R	2688242	463451	17.24	293560	10.92
	U	470522	60634	12.89	3285	0.70
Puri District	**T**	3590026	554689	15.45	127347	3.55
	R	2884022	482332	16.72	107931	3.74
	U	706004	72357	10.25	19416	2.75

T = Total, R = Rural, U= Urban

Geographical distribution of the Scheduled Castes, and Scheduled Tribes in the study region also support this hypothesis. Following Mishra and Nagar (1994) it can be shown in the table 1 that the percentage of SC and ST population are in "inverse proportion to each other". Thus in Sambalpur, the ST population is greater in number than SC population, whereas in Puri and Ganjam SC population has higher percentage than ST population

This variation in the distribution of ST and SC populations in different geographical settings again points to the incorporation of the aboriginal people into caste society. In the coastal districts of Puri and Ganjam with high proportion of fertile alluvial plain, the original aboriginals, under the Hindu influence, took to plough cultivation much earlier than those in the hilly uplands and thus eventually got incorporated into the Hindu society swelling the percentage of SC population and reducing that of ST. On the contrary, the forest-clad hilly uplands of Sambalpur because of its limited cultivable land came under extensive plough cultivation much later. Thus majority of the ST population could retain their originality for longer period sticking to their traditional occupation and lifestyle.[1]

This differential rate of incorporation of aboriginals into the caste society as well as the consequent unique pattern of biological and cultural features of different ethnic groups discussed above are directly related to the difference in the pattern of successive changes in the means and relations of production in the prehistoric and historic past in different geographical settings.

[1] One can argue that the migration of aboriginals from plains to hills is the real reason behind the lower percentage of ST population in the coastal plains, but that does not explain the closeness of the SC population and majority of the Sudras with the ST populations in both biological and cultural features.

The Prehistoric cultural remains show that there are two district zones of palaeocultural development in the study region. On the one hand, the coastal region is almost devoid of Palaeolithic artifacts, on the other, these are widespread and plenty along the hilly forest tracts of Sambalpur. From the late phase of Upper Palaeolithic alluvial plains of coastal district seem to have gained importance for settlement and thus Bhubaneswar region has yielded a marked developed phase of the culture (transition from Upper Palaeolithic to Microlithic industry) which is more akin to that of northern Orissa (Ghosh and Ray 1990-91). In Mesolithic time, Microlithic culture in general presents a homogenous nature and extensive distribution covering almost all geographical regions, such as hilly uplands, rock shelters, river valleys and coastal alluvial plains (Panda 2003).

Prehistoric people were hunter-gatherer and the hunter-gatherer society was egalitarian in nature and each and every person participated in economic pursuit to survive in forest life where the food supply was seasonal and uncertain. In the absence of the knowledge of preservation of food, at the lower and middle Palaeolithic stages of development, sharing of occasional surplus food, however, probably gave rise to an in-group feeling. The flake-blade industry in the subsequent phase of culture is specially meant for a newer type of culture at the time when there was a slow transition of a change of an era from Pleistocene to Holocene. The late phase of Upper Palaeolithic and Mesolithic are thus characterised by an improved climatic condition, introduction of new technology to adopt in the changed environment, more efficient exploitation of food resources and consequent phenomenal expansion of population. The increase in population forced people to colonise new areas like coastal plains and rock shelters. There was, however, the continuation of Palaeolithic economy of hunting-gathering, but the emphasis shifted from big game to small game hunting and equal dependence on plants, animals and fishes for subsistence. In the study region co-occurrence of sophisticated composite tools like microliths useful as hunting and fishing gears and heavy duty forest efficiency tools to complement them during this period no doubt helped the Mesolithic hunter-gatherers to cope in different geographical areas. In general, the Mesolithic people were seasonal migrators and had semi-permanent way of life. They did not know agriculture and in summer months migrated to the coastal areas from the high lands. It is believed that Mesolithic people practiced some form of food storage.

Prehistoric evidences show that Stone age culture of Orissa is intimately related to those of the upland regions of India, especially to the neighbouring regions of Chotanagpur, Mirzapur, the Upper Narmada Valley as well as to the Lower Godavari Valley. In all probability, some of the cultural traits of those regions infiltrated into Orissa through migration of population and uninterrupted cultural exchange. Linguistic evidence (Panda 2003) also indicates migration of people to this part of the country from northern, western and southern India in the Pre- and Protohistoric past. It also suggests a synthesis of three major language families – Indo-Aryan, Dravidian and Austro-Asiatic or Mundari.

Introduction of agriculture in the hunter-gatherer's life in the Neolithic period is believed to have brought revolutionary change in culture. Any important advance in the means of production immediately leads to a great increase in population and relations of production. In the Neolithic Period population expansion together with surplus production as a consequence of agriculture led to sedentary life and formations of villages. In consequence of assured food supply and surplus production a section of people could free themselves and took up other works like pot making, stone quarrying, animal husbandry, basket making, bone working and carpentry. Thus gradually the egalitarian hunting-gathering society became divided into different occupational groups. On the other hand, control on surplus production and its distribution led to the formation of a wealthy class subsequently resulting in the disintegration of the society into the rich and the poor, the ruling class and the ruled, the exploiters and the exploited. Expansion of agriculture, clearing of jungles and shrubs caused rapid decrease of wild animal and plant food resources on which Mesolithic hunter-gatherers had depended for their life. Thus agricultural expansion in the subsequent period forced more hunter-gatherers to assimilate into the expanding agriculture based multi-occupational society. Those who were too conservative or less enterprising stuck to their hunting-gathering pursuit, thereby forming another section in the society.

In terms of Archaeology, Neolithic culture precisely implies a stage of transition from the intensive food collection to food production, and the culture is associated with the grinding and polishing techniques of lithic tools, use of pottery, plant cultivation, domestication of animals, and settled habitation. Even if material evidence of the first three criteria of this culture has been met with in our study region (Panda 2003), direct proof of emergence of agriculture or domestication of animals in the Neolithic period of Orissa is still not forthcoming. But that does not still imply that the Neolithic folk in Orissa did not practice even rudimentary agriculture. Recovery of domesticated rice in Baidyapur (Thapar 1985) and existence of wild rice in Kuchai (Vishnu-Mittre1976), Baidyapur (Vishnu-Mittre 1974) and Jaypore tract of Koraput district (Murty 1988) considered together with the evidence of grain impression on crude hand-made pottery found along with massive and elongated Neolithic celts and ring stones from Dhenkanal (Singh 1988-89, 2000) can be counted as indirect evidence of agricultural practice in Orissa in the Neolithic period. The ceramic assemblage found in these sites is coarse and hand-made; and in case of Dhenakanal it is crude and baked too. The technique of pottery making at these sites associated with cultivation of rice undoubtedly marks a primitive stage of technology compared to Golbai, the Neo-Chalcolithic site in the Khurda district (Sinha 2000); and this, evidently, is suggestive of agriculture prevailing in Orissa prior to *c*. 2300 BC (C-14 date for Golbai Chalcolithic Period). Going by the well developed ceramic assemblage at Golbai Neolithic Period it seems that the culture was in an advanced stage having assured food supply.

The Neolithic culture of Orissa is essentially a part and parcel of the Eastern Neolithic culture (Thapar 1964) comprising Bengal, Bihar and Orissa, and this culture is supposed to be of indigenous origin. But the manufacturing technique of the facetted tools, shouldered celts, wedge and bar varieties of tools as well as cord impressed pottery are considered to have arrived India at a much later date from South China and Southeast Asia (Dani 1960; Sankalia 1974). It has been hypothesised that the manufacturing technique of these developed Neolithic tools and cord marked pottery was introduced to northeastern India by the Austroasiatic, i.e. the Munda speaking people (HeineGeldarn 1945). However, no stone implement has been recovered from the Neolithic level of Golbai. But it is more than probable that because a small area belonging to this period has been exposed, no lithic tool has been encountered. However, surface collection as well as excavation in the subsequent Neo-Chalcolithic level (Period II A) yielded microliths and both indigenous as well as foreign imitation varieties of typical Neolithic tools. Some other evidences from the Neolithic level of Golbai points to a definite cultural contact with South Indian Neolithic sites of the contemporary period (Panda 2003).

In view of this cultural contact with South Indian Neolithic sites which were characterised by specialisation in domestication of animals, absence of the same in the Neolithic level of Golbai is unusual. However, nothing can be said definitely about the nature of Neolithic Culture at Golbai on the basis of the inadequate material findings from the small area of excavation. However, the representation of animals like goat, pig and cattle in the petroglyphs of Deulga rock shelter site (Behera 2000-2001a) in Sambalpur district indirectly suggests a knowledge of animal husbandry and pastoral based subsistence economy in the Neolithic period. Any important advance in the means of production immediately leads to a great increase in population which necessarily means different relations of production. Going by the well developed ceramic assemblage at Golbai Neolithic period it seems that the culture was in an advanced stage having assured food supply, nothing can be said about the relations of production at this stage. However, Neolithic people of the coastal riverine plain must have produced better surplus and had wider exchange network because of their advantageous position in the fertile alluvial plain sandwiched between the plateau-fringe area and the sea coast and thereby having wider range of subsistence as well as access to sea navigation. Sambalpur region, on the other hand, lying in the hilly forest-clad uplands, had little opportunity to have enough surplus or wider range of contact being more dependent on the previous mode of subsistence like food-gathering and hunting. Hence, the people remained in an undeveloped early Neolithic stage.

Correlation between Archaeological and Linguistic Prehistory in the region (Panda 2003) leads to the hypothesis that it is probably the Proto South Munda speaking people who introduced the advanced Neolithic culture initially in the northern part of Orissa while migrating from Bihar under the

pressure of the advancing Dravidian speaking people.

The co-existence and commonness of habitat is likely to have produced a state of biculturism between these two ethnic stocks. However, some degree of bilingualism was an inevitable result of this biculturism, which in turn must have produced an area of linguistic and cultural agreements between these two ethnic sections which must have given rise to a "Dravido-Munda culture" (Bhattacharya 1975) where the characteristics of these two distinct cultures converged with each other. The Neolithic and Neo-Chalcolithic cultures at Golbai and Gopalpur (Kar 1995-96, 2000; Kar *et al*. 1998) probably are the first archaeological correlate of the Dravido-Munda culture, bearing cultural traits of both South Indian and Southeast Asian Neolithic culture.

Golbai Chalcolithic level provides for the first time direct evidence of agricultural practices and tending of animals as an inseparable feature of settled life, and thus substantiates the existence and growth of early farming communities in Orissa. Settled pattern of life and plenty of food must have led to division of labour, which in turn, leads to advent of specialization that divides the community into various occupational groups like farmers, stock breeders, hunters, fishing folks, stone and bone smiths, carpenters, boat makers, potters, coppersmiths, artisans and traders. Different size of huts in the settlement is perhaps indicative of the beginning of social stratification in the Chalcolithic community. Put together, these evidences probably imply emerging complexities in the social and political formation in course of the Chalcolithic period in Orissa and as a mechanism of effective maintenance and management of this complexity, the possibility of emergence of chiefdom. Out of the 13 circular huts with postholes and hearths, the largest may well be regarded as the private property of the chief, more equal among equals. Since copper articles were scarce and prized, their association in the graveyard at Golbai and Sankerjang (Yule and Ratha 2000) can be interpreted again as burial gifts to the chief or members of his family.

Even though onset and development of Chalcolithic culture in coastal Orissa is represented in the Golbai excavation, Sambalpur as a whole has not yielded any such site. However, Post-Neolithic horizon can be obtained from the excavation at the well developed Chalcolithic site of Khameswaripali in the middle Mahanadi valley (Pradhan and Behera 1998; Behera 2000-2001b) situated in the Sonpur region of the Balangir district. Trial vertical digging at three places of the mound have unearthed a well developed village farming culture having cultural linkage with Narhan, Chirand, Senuwar and Golbai Chalcolithic culture in around late 2nd millennium BC. In addition to this evidence at Khameswaripali the wide spread horizontal exposure of sites, associated with the white painted black-and-red-ware, discovered in the lower reaches of middle Mahanadi valley on its right bank as well as in and around the Tel river in the adjoining Balangir district (Appendix) clearly establish that not only coastal Orissa, but western Orissa too witnessed Pre-Iron Age village establishments though at a much later date.

A contact between the Chalcolithic cultures of Middle Ganga plain and the middle Mahanadi valley is well established by these Chalcolithic cultures with white painted black-and-red ware. The sudden development of these sites in post 1200 BC can be explained by the linguistic evidence which speaks of a large scale population migration from the Middle Ganga plain with the advent of the Aryans in around mid 2nd millennium BC (Roy 1912). However the absence of channel bowls, channel-spouted vessels or rusticated ware (which are supposed to be the west Asiatic influence) in the Neolithic and Chalcolithic culture of Orissa possibly indirectly suggests predominance of the influence of Southeast Asian or for that matter Munda culture in the region.

Introduction of iron technology has been symbolised with the intensification of agriculture and thereby a change in relations of production and superstructure of the society. But the appearance of the single primitive piece of iron in the Ferro-Chalcolithic level of Golbai (1100-900 BC) does not register any remarkable change in the Chalcolithic economy of the site. However, it only confirms the fact that the technology of smelting, even though in a nascent stage, made its appearance during this period, and that has significant cultural and economic ramification, no matter if ordinary folk were still clinging to stone and bone artifacts. The appearance of tumbler in black-and-red ware in this period, however, marks West Asiatic influence for the first time.

However, no Iron Age site has been discovered from the coastal region which could throw light on the impact of iron technology on the economy of the people. The lowest levels of Sisupalgarh (Lal 1949) and Jaugarh (*IAR* 1956-57: 30-31) which came up almost 600-700 years later however do not suggest any remarkable change in the material culture of the people. The plain and utilitarian nature of the ceramic assemblage and developed stage of iron technology however suggest an expansion of agriculture. But in the lifestyle of the people it seems there was little change from that of the Chalcolithic period. It seems even in the beginning of the 3rd century BC iron was used only in a restricted amount and was treated as a prized thing. The common man seems to be confining himself to stone, clay, or some perishable materials. This only explains why iron could not bring major change in the material culture of the society even after 600-700 years after the introduction of iron technology in the economy. However, this, on the other hand indicates emergence of stratified society by way of differential distribution of surplus production.

An intermediate stage between the Golbai Ferro-Chalcolithic and the early periods of Sisupalgarh and Jaugarh represented in Period II of Khameswaripali (Behera 2000-2001b) in middle Mahanadi valley helps to have an idea of the consequence of the introduction of iron-technology in the Upland Orissa. Here expansion of agriculture is conspicuous in the appearance of large storage vessels synchronising with a pronounced degeneration in ceramic assemblage. This is no doubt, a repercussion of iron entering the economy and thereby the material culture, in the form of new technology. Moreover, material evidence of burgeoning Early Historic settlements in the middle Mahanadi valley (Appendix) is a sure indicator of the gradual increase in the growth of settlement in the Post-Chalcolithic period as a concomitant and integral aspect of the agricultural expansion and growth of population in the region. This in effect, no-doubt must have made the structure of society complex by way of stratification in terms of production relations.

But for the cultural aspects, Khameswaripali site does not show signs of transformation worth the name. It shows little difference from the Chalcolithic phase in its material culture. Most probably urban values seeped into the general life stream much later and at an almost limping pace probably with the urbanisation in the coastal region.

Thus archaeological evidence clearly shows that before the Kalinga war (261 BC) unequal distribution of surplus production had already been started and 'rank' society was slowly emerging out of the aboriginal egalitarian base. According to Fried (1967: 185, 191) a 'rank' society reflects a stage in the evolution of human society which marks an emergence of a special ruling stratum, while the tribal relations had not yet totally disintegrated. At this stage though surplus was acquired by the aboriginal chief, he did not have any direct control over the means of production and labour (Fried: 117).

The archaeological evidence of the emergence of urbanisation in Orissa (at Sisupalgarh and Jaugarh) coincides with the arrival of the Mauryans which led to the scholars (Seneviratne 1981) to think that urbanisation in this part of the country is a product of Mauryan hegemony Allchin (1989: 15) on the other hand pointed out that it is a product of the 'Pre-Maruyan Gangetic Colonisation' since Orissa was under the rule of Nanda king in 4th century BC.

But urbanisation in Orissa cannot exclusively be the product of external forces The preparation of the ground for the emergence of urbanisation had already been started in the Chalcolithic period which were getting consolidated in the subsequent period with the exposure to other cultures and incorporation of ideas. In that scenario, Mauryan imperial and administrative expansion to the region acted as catalyst for the emergence of urbanisation. Urbanisation in Orissa thus seemed to have followed Allchin's model (1990: 164) of "operation of the colonising factor subsequent to indigeneous development," and as he says, it does not mean that both were not at work during the same period.

The cultural characteristics of the urban centres of Sisupalgarh and Jaugarh in the Pre and Early part of Christian era speak of a mixed culture. From the archaeological materials nothing can be said about the core culture of the region. However, languages used in the inscriptional evidence show that the Aryan cultural influence came to this part of the country in two lines - a broader or more powerful stream came from Magadha, and the other, a thinner one, reached Orissa from western U.P., via

Mahakosala region (Chatterjee 1926: 14). These two streams then must have converged with the local Dravido-Munda culture. From the influence of Dravidian on Prakrit languages in the early period it seems Dravidians were dominant in the local non-Aryan culture of the region. However, this process of convergence was a very slow and prolonged one and the pattern of convergence was most probably same as reconstructed by Southworth (1974) for other parts of the country - Aryan speaking group established itself in some part of the area among non-Aryan speakers. It became the focus of influence for new culture and a new civilization, of which the language is the vehicle. People round about specially the upper class, first picked up the Aryan language and culture while retaining their own speech for sometime and thus became bilingual as well a bicultural. As a result of their bilingualism and biculturism a new hybrid language and culture were created in the process of convergence between the Aryans and the non-Aryan elites.

It is not possible to say at that point of development exactly what language people spoke in. But it is possible that this was the period when Magadhi Prakrit was slowly changing into *apabhramsa* which however registered the dominance of Aryan language in the convergence pattern.

Impact of Mauryan administration on the indigenous society started the process of disintegration and internal transformation of the indigenous 'rank' society to a stratified class society which ultimately led to the state formation in coastal Orissa (Seneviratne 1981). The special edicts of Asoka give an idea of the vertical and horizontal expansion of functionaries and centralised power structure. From that it appears that the local chieftains, operating at the end of the horizontal chain of functionaries, played a crucial role in directing the surplus from the local units to the Metropolis via the provincial government. This association of local chieftains in the Aryan power structure started the process of Sanskritisation/Aryanisation of the local elites and their families who in the long run established a social distinction especially from the agricultural and artisan groups and in the course consolidated their position as a non-producing class and raised themselves up in the horizontal hierarchy. Their position as a vital link between the primary producer and the Metropoliton State may have provided the earliest opportunity to establish some form of direct control over the surplus and on primary producer which consequently led to a greater concentration of wealth and power in their hands creating greater social differentiation based on an unequal distribution of surplus. The Post-Mauryan period thus saw the emergence of lcoal ruling class and 'social stratification with functional hierarchy' (Seneviratne 1981)

However, the Hathigumpha inscription (line eleven) (Barua 1929: 459-85; Jayaswal and Banerjee 1929-30) implies the existence of ruling chiefs in Kalinga prior to the Mahameghavahanas. The consolidation of the ruling chiefs with greater control over the distribution of surplus and means of production and primary producer led to the formation of states in the Post-Mauryan period.

The first institutionalised kingship with north Indian influence in hierarchical functionaries, Sanskritic epithets and ceremonies emerged in coastal Orissa with Kharavela and the Mahameghavahana rule. But the nature of power structure and authority described in Hathigumpha inscription indicates an early stage of State formation with its rudimentary administrative system, vaguely defined territory and centre of government, and an ideology based on the concept of reciprocity (Sahu 2000). In the Post-Kharavela period spread of urbanisation, influence of Aryan culture from north, commodity production, monetisation of exchange, extensive trading and agricultural activity created the economic, political and social platform for the consolidation of the local ruling class; and in consequence a number of local sub-regional kingdoms and forest principalities came into existence in coastal Orissa in the Gupta and Post-Gupta period who were either independent or only temporarily and nominally subjugated by more powerful 'foreign' rulers. These local and sub-regional powers declared themselves Hindu *rajas* by issuing landgrants to Brahmins and by following the role model of their overlords in their political organisation as well as personal and court life. They also wiped out all signs of their probable allegiance to the aboriginal society to such an extent that in most cases there is nothing to point out to their aboriginal origin. Records of landgrants to religious establishments can be traced back to 3rd century AD (Bhadrak stone inscription) whereas landgrants to Brahmins started only in 4th century AD as seen in the Korasanda grant of Vishakhavarman of Mathara dynasty (Rajaguru

1958: 1-3) Thereafter Brahmin settlements continued to multiply in coastal region.

However, the emergence of ruling class out of the local aboriginal base started little later in the mountainous tracts of western and southwestern Orissa. This late development is probably because of the slow and localised spread of urbanisation and Aryan socio-political ideas in this part of the country. Absence of direct control of any dominant Hindu state as well as the restricted expansion of the production of surplus due to disadvantageous geographical factors appear to be other causes of the late development of the process of internal transformation of the chiefdom society to a class society with breaking up of the indigenous mode of production.

However, from the mention of the vanquished rulers and territories in Kalinga and Kosala in the Allahabad Pillar Inscription, it appears that, on the eve of the Samudragupta's southern campaign, some of the aboriginal chiefs of the mountainous tracts could reach the stage of Proto-State formation resulting obviously from the direct control on the means of production and labour by the ruling class. It is only after the spell of Gupta campaign, that a few of the ruling chiefs emerged as local and sub-regional Hindu kingdom builders following the role model of the feudal political and social formation of the Gupta empire. Thus the Nalas in Koraput-Bastar region and the Eastern Gangas in Kalinga rose to power in the 5th-6th century AD and issued landgrants imitating the Gupta rulers.

The landgrants to Brahmins in most cases acted as a vehicle for setting in motion the process of incorporation of aboriginal societies into *varna*/*jati* differentiated Hindu society. It involved incorporation of the selective aboriginal powers into the rank of the Kshatriyas and, in rare cases, of the Brahmins and mass relegation of the rest of the population to the rank of the surplus producing Sudras. In this scheme, the immigrant Brahmins played a crucial role in the consolidation of the newly emerged kingdoms, which were –

i) to help the aboriginal king to strengthen his claim for Hindu status and legitimacy by writing fictitious genealogies and organizing impressive *Vedic* sacrifices and Hindu religious ceremonies.
ii) to spread, with the help of the Hinduised king, Brahmanical ideology (i.e. sacred duty of carrying out *varna* functions and obeying the king) and culture and thus to facilitate the subordination of peasantry.
iii) to spread the knowledge of plough culture and livestock management among the aboriginal population, thus to facilitate the progress of backward 'swidden' cultivators to the more productive stage of plough-based agriculture.

Thus the Brahmins, as agents of the king, helped to create the economic conditions for the enhanced production of surplus as well as the ideological conditions for the appropriation of surplus by the newly emerged elite and in doing so they also forced the pace of transformation of the hitherto aboriginal societies through acculturation and peasantisation.

The large number of landgrants issued in coastal Orissa in 5th-6th century AD, thus indicate a large scale agrarian expansion, spread of Brahmanic culture, cystalisation of class society with developing feudal character and a greater convergence between Aryan and non-Aryan cultures resulting in a changing socio-economic milieu. Whereas emergence of only two kingdoms with only a few landgrant charters and an immature socio-political organisation in the vast hilly tracts of western and southwestern Orissa again suggest a slow and restricted pace of the transformation of the aboriginal society. But in this period, landgrants were issued only by the ruling families, and there is no record of private landgrant; it is thus obvious that private ownership of land had not emerged yet. On the other hand, the king had retained absolute control over land, water and forest. The limited number of taxes, feudal titles, *Vedic* sacrifices and rituals and above all silence on the existence of caste system no doubt indicate the formative stage of the social evolution from tribal to feudal order.

A full-fledged feudal society with all its characteristic features developed in the Early Medieval Period with the emergence of a series of regional, sub-regional and local kingdoms in different pockets, each of them issuing a number of landgrants. Most of these powers can be traced back to their aboriginal origin. This evidently points out that the process of transition of tribal societies into *varna/jati* differentiated society of early Hinduism gained momentum in the Early Medieval Period. A clutch of identifiable upwardly mobile aboriginal chiefs and the lineages in which

they belonged, seemed to have acted as principal agencies of this transformation. The kings needed military support and loyalty of the chief for internal security of the kingdom as well as to defend their kingdoms against outside attack. The strength of aboriginal power often enhanced their personal power in the political hierarchy. Moreover, this also helped the kings to appropriate agricultural surplus through the aboriginal chief from his land; a king also could considerably extend his wealth and his landed property through raids. Landgrants to Brahmins or to other Hindus in aboriginal lands were thus the way to initiate the process of building these agencies. Indoctrination to the rank of Kshatriyas and Sudras thus planted the seed of social stratification in aboriginal society. The chiefs who were given military duties by the kings also found the ideology of Brahmanical Hinduism an extremely useful means of creating a class-based elite out of their largely undifferentiated societies. It was the Brahmanical ideology which legitimised their power and control over surplus and primary producers. The contradiction between aboriginal folk society and Brahmanical State society was thus resolved by the combination of consent and coercion. However, this transition from the aboriginal to the feudal mode of production facilitated the progressive absorption of the aboriginal communities into an ever expanding Hindu society. And the emergence of the aboriginal chiefs as Hindu kingdom builders symbolised their incorporation and integration, of course through Sanskritisation, into the Brahmanical Hindu ruling class. In Early Medieval Orissa large number of landgrants made in the forest-clad hilly hinterlands thus led to the continuous formation of a number of local principalities, sub-regional and regional kingdoms till the unification of Orissa under the Gangas in 12th century AD. A study of the royal land donations to Brahmins in the Early and Early Medieval Orissa reveals that the early donations were usually granted to the families of the royal priests at the central courts (*Rajagurus*, etc.) and to individuals and small groups of Brahmins in quite remote places and this phenomenon can be noticed till the end of the 10th century AD (Kulke 1978: 133).

This phenomenon no doubt indirectly indicates continuous period of large scale incorporation of hitherto aboriginal communities into Hindu fold. Thus, though *Varnashramadharma* was said to have been established by the Bhaumakara rulers even in the 8th century AD, (*EI* 15: 1-8) organisation of different caste groups with specific occupational identity crystalised only in 11-12th century AD. Before that pursuit of accumulation combined with hereditary right on property and privilege in the feudal social structure naturally gave rise to a number of castes and sub-castes; though *pratiloma* and *anuloma* marriages must have worked as a secondary factor. However, owing to strong *adivasi* legacy social stratification did not manifest any marked rigidity at the levels of work, marriage and social intercourse based on purity-pollution. There was some room for mobility across the *varna* hierarchy as it is evident from the rise of the Kshatriya / Khandayat as well as Sudra from among the aboriginals. The mention of the *varnasamkara* in the inscriptions (*EI* 15: 4; 28: 213) is a sure pointer to this caste mobility in the society. The superimposed Brahmanical Hindu superstructure had to be lenient to this fluid conditions of *varna* hierarchy to maintain Brahmanic hegemony in the society.

Thus we find an initiative from the Hindu/Hinduised kings and Brahmins to patronage aboriginal as well as local popular deities and to assimilate associated cultural features with local Hindu culture for their own survival. On the other hand the aboriginals tried to raise themselves in the social hierarchy through Sanskritisation and acculturation. Thus a continuous continuum between the great tradition (Brahmanical tradition) and the little tradition (folk tradition) (Redfield 1956) started with establishment of the Brahmanical culture in the land. However, it should be borne in mind that when the great tradition reached Orissa it had already achieved a level of assimilation which moved along a common pattern.

In order to gain both vertical and horizontal legitimacy of their political authority, the ruling dynasties always made use of the autochthonous deities and the other popular religions to consolidate their rule in the conquered areas. Kharavela patronised Jainism, the popular religion of the time in Orissa and the Jaina sculptural art at Udayagiri and Khandagiri reflected an assimilation of the gods and goddesses of the indigenous *adivasis*. The Bhaumakaras patronised Buddhism which had to merge with the age old *tantra* religion of the land. The Matharas and almost all other Hindu/Hinduised kings established *Vedic* culture. But the process of Brahmanisation gave rise to the popularity of *Bhagavata, Saiva* and *Sakta* cults 'in

an answer to the ethical demand and spirit of the newly emerging socio-economic pattern' (Kosambi 1962: 31). *Bhagavata* cult became a powerful religious movement in South India from the late 6th century onwards. It was mainly through this impressive folk devotionalism that Pan-Indian Brahmanical Hinduism in a continuous process of two-way communication came down to the villages and rural centres of southern and southwestern Orissa. Various autochthonous deities in a long and gradual process of Hinduisation were included into the pantheon of *bhakti* Hinduism (Kulke 1978: 132). Thus it seems that Matharas deliberately patronised *Bhagavata* religion to gain legitimacy in the eyes of the people. It is very likely that worship of Siva/Linga and Sakti/Mother goddess in some form or other was there in the indigeneous society from very early times. They became only more popular in the form of Hindu god and goddess that went with the large scale Hinduisation of the indigenous people. In fact they are supposed to have facilitated incorporation of aboriginal gods and goddesses into Hinduism from very ancient times. However, the confrontation of the great traditions with a congeries of local little traditions with various mother goddesses only made *Tantrism* and *Saktism* the substratum religion of the land. The force and dominance of *Saktism* was so vital that no other religions could establish themselves firmly in Orissa without ultimately being merged with it. This assimilation of great and little traditions became more conspicuous in the acceptance of aboriginal deities as family and tutelary deities by the Hindu/Hinduised kings in order to gain support and loyalty of the powerful aboriginals in their respective lands. The Eastern Gangas after conquering the area south of Mahendragiri mountain acknowledged Siva-Gokarnasvami, a deity of the Savara tribe, and Stambhesvari worshipped by the Sulkis and the Bhanjas as family deities. However, Stambheswari was first patronised by the *Raja* Tustikara of Boudh-Sonepur region in 5th century AD. The *Maninagesvari* cult was also patronised by the Vigraha rulers of the south Tosala (Kulke 1977). However, all these autochthonous deities underwent a process of Hinduisation with the rise of their originally aboriginal patrons as Hindu ruling power. All these goddesses are still worshipped in their respective areas both by caste Hindus and Scheduled Tribes and Castes. It appears that 'patronisation of the upper strata of the social hierarchy helped in the upward mobility of the folk religious beliefs and their upholders belonging to the lower strata of the social hierarchy to gain prestigious status in the society as the castes and classes cut cross each other in a transitional period. This upward mobility and the conflict of classes led to synthesis' (Das 1984: 28).

The rise of Jagannatha cult as a Vaishnava god out of a Savara deity under the patronage and initiative of the Hindu *raja*s assimilating all extant religions of the land and with all-inclusive philosophy is the best example of this synthesis, which indeed reflects the very soul of Oriya life and culture. All the three regional powers Somavamsis, Imperial Gangas and Gajapatis, being alien rulers, sought to legitimise their authority by recognising and giving patronage to the most powerful and popular local cult and it gradually attained a regional character to register the emergence of Ganga and Gajapati imperialism.

With the unification of western Orissa with the coastal part under the Somavamsis in the early 11th century AD, the period of the early sub-regional State formation of Orissa 'from below' (Kosambi 1956) came to an end. This also coincides with the crystalisation of distinct caste groups and changing pattern of the donation of lands from the end of the 10th century AD onwards. It appears that large groups of sometimes several hundred Brahmins were systematically settled often near the political centres of the Kingdoms (Kulke 1978: 133) in the plains. Thus the period of large scale, indiscriminate detribalisation and Hinduisation got over and the process of universalisation started with strict caste system and Brahmanical hegemony. With the unification of Orissa into one regional state in the 12th century AD under the Ganga king Chodagangadeva this process got momentum and the overarching power and prestige of Brahmins reached its culmination in the Gajapati rule.

However, the value system of religious institutions always acted as a catalytic agent to the dynamics of change in vehicles of expression (Das 1984: 31) i.e. language change through literary expressions. Thus the evolution of Proto-Oriya from Magadhi Prakrit through *apabhramsa* by the 10th century AD and the formation of Oriya (with features of Dravidian/Telugu language) as an Indo-Aryan language in the 11th century AD were synchronised with the socio-religious changes in the region. It is only after the Brahmanisation of Jagannatha cult and associated rituals with the

appointment of pure Brahmin priests (of course in demand of the time) in the late 13th century AD (Dash 1978: 163), genuine Oriya, akin to modern colloquial Oriya, evolved from its earlier dialectal form in 14th century AD. It should be mentioned here that up to 13th century AD. Jagannatha cult was worshipped by the originally non-Brahmin priests whose power and position corresponded with that of the deity they worshipped (Dash 1978).

It appears, by the 15th century AD the great tradition seemed to have transformed into an identifiable regional great tradition, in the process of continuous coercion and cohesion with various local little traditions, which found expression in the formation of Jagannatha triad and in the development of vernacular literature comprising *Mahabharata, Ramayana, Bhagavata*, *Harivamsa* and *Puranas*, re-written mostly by the non-Brahmin poets and literatures in the 15th-16th century.

The Ganga rulers established overlord-feudatory relationship with the Lord Jagannatha in order to have vertical and horizontal legitimisation and control over different powerful feudatories having individual cultural and socio-political set-up. The Gajapatis and thereafter the *raja*s of Khurda also followed this policy. In this overlord-feudatory scheme, Lord Jagannatha was the protector and sovereign of Orissa and the Paramount *raja* was his deputy or son; thus *raja* himself was conceived as mobile god being the descendant of the Lord Jagannatha. As such the *raja* in the palace and the god in the temple underwent similar daily rituals. Though not in absolute conformity, basically the same component of castes rendered more or less similar secular and ritual services in the temple as well as in the palace (Patnaik 1970). Because these services were performed for divinities, whether in temple or palace, caste duties acquired the characteristics of ritual obligations. Thus Mahapatra (1976) opines that caste system in Orissa began to be well differentiated according to their rights and duties as well as hierarchical relative positions in the State deity's temple and the king's palace, which, however, present close parallels with that of the Lingaraj temple of Bhubaneswar. In the 'centralised ritual structure' (Kulke 1978: 135) of the regional kingdoms the feudatory kings, after the model of the king of Orissa, claimed to have divine origin to legitimise themselves in their respective kingdoms, and they were conceived as minor gods in the image of the Paramount king. The State deity cult also was introduced to their kingdoms which very often was superimposed on the prevailing tutelary deity of a Hinduised autochthonous cult. With the introduction of State cult, caste duties were also invested with ritual values. Even, to judge on caste matters *Pandit Sabha* of some sort following the *Mukti Mandap Sabha* (Supreme Council of Brahmin scholars) of Jagannatha temple in Puri was also introduced. However, ritual services in these temples were not so elaborate or differentiated as in the State cult though there was close resemblance. At the village level temples this elaboration of caste service decreased progressively though in ritual character the model of the State cult was retained (Mahapatra 1976).

Establishment of this centralised ritual structure from the Ganga period onwards, however, had helped in the percolation of the great regional tradition into the village levels in different parts of Orissa, which, in the common process, started converting the local little traditions into its "civilised dimensions" (Redfield and Singer 1956: 168) and acted as a vehicle for the formation of common cultural consciousness from which the great regional tradition was fashioned (Redfield and Singer 1956: 186) This integration and universalisation indeed helped in the development of Oriya Nationalism in the Colonial Period.

But the geographical location of many of the small local principalities in the forest-clad, hilly hinterland was responsible for the fact that not even the most powerful kingdoms ever succeeded in bringing many of them totally or permanently under their control, even when they were near the capitals of the kingdoms. In Orissa, therefore, for a long time, the influence and control of Central Power was marginal on these jungle kindgoms. Being politically autonomous entities, naturally they behaved as economically and socially autonomous units. Study on the ex-principalities of the18th century (Mahapatra 1984) reveals that these principalities and *zamindaries* represented exclusive social groupings with slightly distinctive caste hierarchies and patterns of interactions among castes, which might deviate not only from the neighbouring region, but also from the regulations and interpretations of the *Sastras*. Though in overall features of caste system (caste interactions, status equivalence and hierarchy), political set-up and ritual organisation they followed more or less (not an absolute replica) the model evolved at the

political and religious centres of the State. Most of these princely houses and *zamindaris* are alleged to have Khond/Gond or other aboriginal blood or foster parentage but they all claimed a Kshatriya or Rajput origin. Most of them either rose to power from the local dominant aboriginal group or with their support. Their vital dependence upon the support of various aboriginal groups can be understood from the important role played by one or the other aboriginal groups in the coronation ceremony of the *rajas* and in the other royal festivities in these Hindu ex-states (Mahapatra 1987).

However, these *rajas*, Hindu or Hinduised, often played a vital role in integrating the aboriginal people in the caste system and helped to universalise some local traditions centring around local gods and cults. Thus almost all these *rajas* sponsored the settlement of Brahmins and other high castes, artisan castes, service castes besides agricultural and warrior castes for agricultural, industrial, commercial and religio-cultural promotion and development of the defence capacities of the princely states (Mahapatra 1987). However, induction of Hindu caste, and specially Brahmin priests was necessary to establish a Hindu state and to legitimise their Kshatriya/Rajput status. The large scale import of Hindu population no doubt also means introduction of Hindu gods, rituals, festivals, ideas, beliefs and values (Sinha 1958) besides affecting internal stratification of the aboriginals based on grades of assimilation into higher Hindu caste culture and on interaction with higher Hindu castes (Sinha 1962). Some of the northern ex-states had also sponsored the immigration and settlement of many aboriginal groups (like Ho, Munda, Santal, Kharia, Oraon and Kurmi) from Bihar for agricultural development, extension of improved agricultural practices to the resident aboriginals and for general increase in the state revenue. Similarly, the highly proficient cultivator castes of western Orissa, Kulta and Agaria were also sponsored by some princely states (Mahapatra 1987). However, all these developments in the Medieval and Colonial periods should be viewed in the background of the political and economic changes taking place in the society. The ruling class losing their political and economic power were getting desperate to improve their economic and social positions whereas insecurity and uncertainty in common people's life led to large scale migration and economic and social mobility.

In this changing situation, understanding the economic and social pressure on the subjects, many *rajas* showed a pragmatic attitude towards caste disputes and having the supreme power in caste matters within their locality, they often played a paradoxical role of the preserver of as well as the catalytic agent for change in caste order within their area of control.

Moreover, these *raja*s were also intstrumental in integrating aboriginal traditions with higher tradition through a process of universalisation. All these Hindu/Hinduised *raja*s patronised powerful cults of minor gods and goddesses of the dominant tribes of the area; even they introduced these deities in their palace and worshipped them along with traditional Hindu gods and goddesses. In most cases the *Istadevata* of the *raja*s and the *Rastradevata* of the principalities were aboriginal Hinduaised deities. Such examples are not rare in Ganjam, Kheonjhar, Bonai and Mayurbhanj (Schnepel 2002: 231; Mahapatra 1987: 41). In Sambalpur also Chauhan *rajas* had adopted the tribal goddess Samalai as state deity which was actually the *Istadevata* of the Sabara tribe. In these regions spread of Jagannaha cult with established temples was a later development.

Acceptance of aboriginal gods and goddesses and related rituals by the Hindu *rajas* to woo the dominant aboriginal subjects implies again their gradual admission into a larger Hindu society with consequent process of Hinduisation of the deity as well as their original worshippers. But this process of Hinduisation of the autochthonous deity is ultimately linked with the process of tribalisation as transformation of an aboriginal deity to a Hindu deity does not necessarily mean addition of Sanskritik elements and replacement of tribal elements or vice-versa, rather it means a harmonious co-existence of both aboriginal as well as Sanskritik elements.

In these hilly regions where Hindu Oriyas were immigrants and minority, process of tribalisation was only natural and essential which aided them to enjoy the confidence of the aboriginals and seek their co-operation in settlements. Acculturation and incorporation of an aboriginal group into the Hindu society also does not necesarily mean a complete replacement of their cultural features in favour of the newly adopted culture. In view of this, neither Hinduisation nor tribalisation exclusively is found to be helpful in explaining and understanding the

process and pattern of culture change. There is every possibility of aboriginal and Hindu elements co-existing in both the societies.

The linguistic evidence too emphasis this convergence and cross-cultural assimilations. It is seen, because of the dominance of non-Aryan elements in the convergence pattern Oriya language has taken to the dialectal form of Sambalpuri in the western hilly uplands. All other tribal dialects of Oriya (Bhatri, Bhuyan, Kandha, Dal, Sahara/Soara, Binjhal, Sabar and Gondo) have also been reported from the forested upland regions of western and southwestern Orissa which show a greater replacement of Indo-Aryan features with non-Indo-Aryan ones than do the Standard form of Oriya spoken in the plains. This indicates much less accurate transmission of the prestige language in the remote regions making greater convergence inevitable. However, development of a variety of different modifications of Standard Oriya points to different kinds and degrees of contact between the prestige language speaking Oriya elite and the Dravidian/Munda speaking indigenous mass. Thus the linguistic situation which can be observed today in Orissa seems to be the result of a long period of accommodation between the extremes of the Original continuum - the Aryan/Oriya educated upper class and the Dravidian/Munda lower class. The mechanism of this process of accommodation, as pointed out by Southworth (1974: 219) is probably to be found in the interaction of social groups such as those required by traditional agricultural operations at the village level - the landowners, intermediaries. (such as tenants or managers), labourers - with very limited contact between members of the highest and the lowest groups, intermediate groups would be affected by cotnact with both extremes. According to Southworth (1974), since traditionally these three groups represent three hierarchical stages of the caste structure - Brahmin, Khandayat and Vaishya, Sudra respectively - they produced three different social dialects of Oriya which are typical to those castes only. However, the differences between social dialects are now reducing fast with the efflects of modernisation education and social mobility which are the hallmark of Colonial and Post-Independence Periods. Before 19th century, the process of assimilation or acculturation of *adivasi* people had taken place within a different social order, but after that the *adivasis* have to undergo changes and acculturation mainly due to the actions of the missionaries, administrators, anthroplologists and the Tribal Welfare Institutes. In the words of Desai (1978: 78), all such changes have taken place "within the frame work of social order which is being founded on a mixed economy, functional planning and profit orientated production for a competitive market".

Since independence, beginning with the nationalist movement, democratisation of the polity and empowerment of the masses, including the weaker sections and underprivileged sections, like the women, has brought some change in Orissan society. The quasi-feudal structure of the princes and *zamindars* has been abolished and new institutions like *Panchayati Raj* have been introduced to empower democratically the rural people, women, Scheduled Castes and Scheduled Tribes at the grass-root level where the old power structure is firmly rooted even after 56 years of independence.

Education, economic upliftment, empowerment, social-status mobility movement - all these have only created greater differentiation among the Scheduled Castes and Scheduled Tribes and greater convergence with the high caste groups. But now the Scheduled Tribes do not encourage absorption into caste society, rather they have realised that to gain real status today would be to accept the protective cover of tribal identity and political power. However, only the Hinduised educated tribes have reached to this stage of realisation, the other section is still in a very neglected and poor condition.

All these changes in the Post-Independence Orissa however could not change the social attitude towards the Scheduled Castes and Tribes. In village Orissa, age-old values associated with specific castes, tribes and tribal people in general have not been changed yet. The old feudal power structure, firmly rooted in rural Orissa, will take time to accept empowerment of poor and despised.

Thus, from the reconstructions of the socio-cultural development in Orissa with the help of archaeological, linguistic, ethnographic and historical data it is evident that contemporary society and culture in Orissa is a product of the combined effects of different continuous processes of migration, integration and assimilation of different people and cultures. Throughout its historical development incorporation of the autochthonous people into the Hindu fold and the

degree of cross-cultural assimilation in different settings are the basic dynamics of the growth and maturation of the society and culture in the region.

To express in linguistic terms, this social dynamics is represented in three strata of convergence between different ethnic/linguistic groups. In the upper stratum Oriya element is dominant in the pattern of convergence which is borne out by the fact that the contemporary Dravidian and Munda people of the area are gradually becoming 'Oriyanised' or absorbed by them. In the middle stratum, however, Sanskritic elements, or to be precise, original Indo-Aryan elements became dominant absorbing local indigenous people into the Aryan fold. And in the lower stratum, in the convergence pattern between Dravidian, Munda and other indigenous people, Dravidian was dominant. The product of these stages of convergence is the language and culture which are basically and predominantly Aryan but there are many elements which have to be traced to other two sources of Dravidian and Munda that contributed greatly to the birth and growth of the society and culture. The historical process of centuries old contact, borrowings and sharing of cultural and linguistic features and concepts across the ethnic boundaries led to the synthesis and homogenisation of regional socio-cultural features.

Orissan society, which has not yet shed off its predominantly rural character (rural population constitutes 82.62% of the total population), and which still shelters a large number of non-Hindu *adivasi* people, is still undergoing this process of synthesis. Thus society and culture in Orissa is unique in its character though it exhibits many fundamental Pan-Indian features in its component elements.

APPENDIX

Distribution of explored and excavated sites associated with Black-and-red ware Pottery in the lower part of the middle Mahanadi valley of Orissa (Mohanty and Mishra 1998)

Sl. No.	Name of the site	District	Ceramic Industries	Other finds	Remarks
1.	Gariapale (Expl.)	Subarnapur	Plain BRW (bowls and vases with flaring rum and globular body); BSW (deep bowls and vases); RSW (globular vessels, pedestalled bowls, storage jars, lids, etc.); plain and rusticated red ware	Pottery discs, semiprecious beads and terracotta cakes.	Early Historic
2.	Kartang (Expl.)	Subarnapur	Plain-black-and-red ware (convex sided deep bowls, globular vases with splayed out rim, and carinated *handi*); black slipped ware (bowls and vases with evidence for burnishing); plain red ware and red slipped ware (bowls, vases, storage jars, *handi*, lids with handle and basins)	Pottery discs, stone discs, two ground Neolithic cells of dolerite, and faunal remains.	Protohistoric/ Early Historic.
3.	Pankital (Expl.)	Subarnapur	Plain BRW (small-sized vases and carinated as well as bowls); BSW (vases, carinated shallow bowls, and dishes with a central knob on the flattened inner surface); RSW and RW (basins, vases, bowls, storage jars and platters)	Pottery disca, beads of semiprecious stone, iron slag and skeletal materials.	Early Historic
4.	Tenda (Expl.)	Subarnapur	BRW of fine fabric (bowls and lids); BSW (knobbed dishes, bowls and lids); RW and RSW (vases, bowls, lids, storage vassels, and miniature pots)	Microliths, pottery discs, terracotta cakes with finger pressed designs, stone discs and beads.	Early Historic
5.	Khajeripali (Exca.)	Subarnapur	Few sherds of white painted BRW; plain BRW (bowls, dishes	Slags, terracotta beads, faunal remains, pottery	Protohistoric single cultural site

Sl. No.	Name of the site	District	Ceramic Industries	Other finds	Remarks
			and vases); BSW (bowls, basins and vases); RW and RSW (vases, storage jars, bowls, *handis*, lids, bowls-on-stand, perforated bowls and platters); corded ware	Discs.	(?)
6.	Hikudi (Exca.)	Subarnapur	Hand-made coarse, gritty red ware Pottery with cord marks on the exterior and interior surface (vases, bowls, *handis*, pedestalled bowls and lids); plain BRW (dishes and bowls); RSW and RW Pottery; decorated sherds	Ground Neolithic celts of dolerite and basalt, stone sling balls, terracotta animal figures, a large quantity of finished and semi-finished stone beads and terracotta ring well.	Neolithic/ Early Historic
7.	Khames-Waripali	Subarnapur	-	-	See this report
8.	Kumer-Singha (Expl.)	Subarnapur	Plain BRW (bowls, vases and dishes); BSW (bowls, dishes and vases); RW and RSW (vases, *handis*, lids, storage vessels, platters and basins)	Pottery discs, stone pestles, semi-precious stone beads, sling balls, copper plate inscriptions, iron objects, miniature figurines of semi-precious stone and a few megalithic structures.	Protohistoric/ Early Historic.
9.	Nuagarh (Exca.)	Subarnapur	Plain and white painted (?) BRW, BSW, RW and RSW Pottery	Pottery discs, iron objects, stone beads, stone pestles and slags.	Early Historic/ Protohistoric (?)
10.	Jamtangi (Expl.)	Boudh	White painted and plain BRW; BSW; RW and RSW Pottery	Pottery discs, iron objects, stone beads, terracotta beads and stone pestles.	Protohistoric/ Early Iron age (?)
11.	Tentulipali (Expl.)	Boudh	White painted and plain BRW; Rw and RSW Pottery	Microliths, stone pestles, Neolithic ground axe and faunal remains.	Protohistoric
12.	Maryakud (Expl.)	Boudh	Plain BRW (bowls and dishes); BSW (jars, lids, bowls, basins and lamp-on-stand); RW and RSW (bowls, lids dishes, basins, decorated sherds, vases, basins, storage vessels, etc.); knobbed ware	Semi-precious stone beads, iron slags, pottery discs, faunal remains, and microliths.	Early Historic (see Tripathy, B., 2000, pp. 401-414).
13.	Krishna-Mohanpur (Expl.)	Boudh	Plain and white painted BRW; BSW; RW and RSW Pottery. Majority of the sherds shows evidence of burnishing	Perforated ring-stone pestles, a few microliths, and two ground Neolithic axes.	Protohistoric/ Early Iron Age (?)
14.	Karadi (Expl.)	Boudh	Plain and white painted BRW, BSW, RW and RSW Pottery	Perforated ring stone, a few microliths and pottery discs	Protohistoric (?)
15.	Hatgaon (Expl.)	Boudh	Plain BRW, BSW, RW and RSW Pottery; (bowls, vases, basins, lids with cylindrical handle, dishes, shallow bowls-on-stand, are some of the common shapes)	Perforated ring stone, two broken parts of stone pestles, and terracotta figurines.	Early Historic.
16.	Pargalpur (Expl.)	Boudh	Plain BRW, RW and RSW Pottery	Iron bar-celt, microliths and stone pestles	Early Iron Age (?)
17.	Dholpur (Expl.)	Boudh	Plain BRW, RW and RSW Pottery	Pottery discs and stone pestles	Early Historic
18.	Belpunji	Anugul	Plain BRW, BSW, RW and RSW	Stone pestles and small-	Early Historic

Sl. No.	Name of the site	District	Ceramic Industries	Other finds	Remarks
	(Expl.)		Pottery	sized ground Neolithic celts	
19.	Manamunda (Exca.)	Boudh	Plain BRW, BSW, RW and RSW Pottery; decorated jars; very large-sized storage jars, etc.	Brick structures, iron and copper objects, punch marked coins	Early Historic (*IAR* 1989-90).
20.	Manamunda II (Expl.)	Boudh	Plain BRW, BSW, RW and RSW Pottery and decorated sherds; (common shapes include bowls, dishes, vases, storage jars and lids)	Iron objects, pottery hop scotches, soakage jars and stone beads.	Early Historic
21.	Gabjuri (Expl.)	Boudh	Plain BRW, RW and RSW Pottery	Pottery discs and stone beads	Early Historic
22.	Haldipali (Expl.)	Subarnapur	Plain BRW, BSW, RW and RSW Pottery; decorated sherds and lids of various type	Terracota ring well, pottery discs, stone pestles and iron objects.	Early Historic

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